

ELE

OF

OPERATIVE SURGERY.

TRANSLATED FROM THE FRENCH OF

A. TAVERNIER,

DOCTOR OF MEDICINE OF THE FACULTY OF PARIS, LATE SURGEON TO THE THIRD
REGIMENT OF MARINE ARTILLERY, SECRETARY-GENERAL OF THE
ATHENÆUM OF MEDICINE OF PARIS, &c, &c.

WITH COPIOUS NOTES AND ADDITIONS,

BY

S. D. GROSS, M. D.

CORRESPONDING MEMBER OF THE ATHENÆUM OF MEDICINE OF PARIS, &c. &c.

Manu strenua, stabili, nec unquam intremiscente.—CELSUS.

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1829.

Eastern District of Pennsylvania, to wit:

BE IT REMEMBERED, that on the twenty-ninth day of October, in the fifty-fourth year of the Independence of the United States of America, A. D. 1829, John Grigg of the said district hath deposited in this office the title of a book, the right whereof he claims as proprietor in the words following, to wit:

“Elements of Operative Surgery. Translated from the French of A. Tavernier, Doctor of Medicine of the Faculty of Paris, late Surgeon to the Third Regiment of Marine Artillery, Secretary-General of the Athenæum of Medicine of Paris, &c. &c. With Copious Notes and Additions, by S. D. Gross, M. D. Corresponding Member of the Athenæum of Medicine of Paris, &c. &c.
Manu strenua, stabili, nec unquam intremiscente.—CELSUS.”

In conformity to the Act of the Congress of the United States, entitled “An Act for the encouragement of learning, by securing the copies of maps, charts, and books to the authors and proprietors of such copies during the times therein mentioned;”—And also to the Act entitled “An Act supplementary to an Act entitled ‘An Act for the encouragement of learning by securing the copies of maps, charts, and books to the authors and proprietors of such copies during the times therein mentioned,’ and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints.”

D. CALDWELL,
Clerk of the Eastern District of Pennsylvania.

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PREFACE.

THE original of the present work was published in Paris, in 1828, and has been already translated into the Italian, the Spanish and the German. It contains an abstract of the writings of the most eminent American and European surgeons, especially of those of Abernethy, Barton, Beer, Bell, Boyer, Cloquet, Cooper, Delpech, Dubois, Dupuytren, Gibson, Graëfe, Guthrie, Hennen, Lallemand, Larrey, Lawrence, Lisfranc, Marjolin, M'Clellan, Mott, Physick, Richerand, Roux, Scarpa, Travers and Vacca-Berlinghieri; men who are at once an honour to their countries and ornaments to modern surgery.

With a view of rendering the work more complete, and of giving a condensed account of the present state of Operative Surgery in the United States, a considerable quantity of new matter has been added, either in the form of new articles, or in that of notes, printed in a distinct type at the end of each paragraph of the text which they are intended to illustrate.

I can not conclude these observations without expressing a hope that the profession may soon be favoured with a translation of Dr. Tavernier's work on Clinical Surgery, which appeared about two years ago in Paris. It contains an exposition of the diagnostic signs and morbid characters of surgical diseases, with a summary of their curative indications, and seems to be extremely well calculated to facilitate the investigations of the student and country practitioner.

S. D. G.

Philadelphia, October, 1829.

ERRATA.

<i>Page.</i>	<i>Line.</i>	
10,	39,	<i>for</i> when <i>read</i> where.
18,	27,	chlorite <i>read</i> chlorine.
27,	41,	humour <i>read</i> tumour.
44-105,	27-25,	hydro-chlorite <i>read</i> hydro-chlorate.
71,	4,	observations of <i>read</i> observations on.
74,	49,	chlorites <i>read</i> chlorides.
79-85,	20-20,	chlorite <i>read</i> chloride.
82,	20,	arsenic <i>read</i> arsenic.
92,	18,	article of <i>read</i> article on.
107,	42,	staphylorophy <i>read</i> staphyloraphy.
173,	37,	forceps <i>read</i> scissors.
232,	11,	related of <i>read</i> related by.
258,	41,	it <i>read</i> if.
259,	3,	stylet <i>read</i> stylet.
286,	21,	irruption <i>read</i> eruption.
294,	19,	herniæ <i>read</i> hernia.
296,	6,	syrax <i>read</i> styra.
298,	38,	passage to <i>read</i> passage of.
378,	19,	serratus articus <i>read</i> serratus anticus.
425,	19,	axilal <i>read</i> axilla.

INTRODUCTION.*

SURGERY has been by many considered to be that branch of medicine, which principally effects the cure of diseases by the application of the hand alone, the employment of instruments, or the use of topical remedies. But although this definition certainly conveys to us some idea of the nature of this most useful profession, it is not entirely accurate as applied to the present state of practice. It might, indeed, be correct during that short unfavoured period of surgery upon the Continent, some centuries ago, when its practice was denounced by the Council of Tours, as unfit for the hands of priests and men of literature, and when the surgeon became little better than a sort of professional servant to the physician, the latter alone not only having the sole privilege of prescribing internal medicines, but even that of judging and directing when surgical operations should be performed. Then the subordinate surgeon was only called upon to execute with his knife, or his hand, duties which the more exalted physician did not choose to undertake; and, in fact, he visited the patient, did what was required to be done, and took his leave of the case, altogether under the orders of his master. In modern times, however, the good sense of mankind has discovered that surgery is deserving of an eminent rank amongst such arts as ought to be cultivated for the general benefit of society; that the man who is not himself accustomed to the performance of operations, can not be the best judge of their safety and necessity; and that, in every point of view, the surgical practitioner merits as much favour and independence in the exercise of his profession as he whose avocation is confined to physic. Hence, the surgeon is now exclusively consulted about many of the most important diseases to which the human body is liable. Being no longer under the yoke of the physician, he follows the dictates of his own judgment and knowledge; he prescribes whatever medicines the case may demand, internal as well as external; and under the encouragement of an enlightened age, he sees his profession daily becoming more scientific, more respected, and more extensively useful.

By some writers, physic is said to have for its object the treatment of internal; surgery, that of external diseases. The

* The introduction, containing a history of surgery, has been taken almost verbatim from the last edition of Mr. Cooper's Dictionary, published in London in 1825.—S. D. G.

definition, however good and plausible it may at first appear, can only be received with numerous exceptions in regard to modern surgery; for instance, the psoas abscess, stone in the bladder, an extravasation of blood within the skull in consequence of accidental violence, are universally allowed to be strictly surgical cases; yet, no man in his senses would call these disorders external.

Others have defined surgery to be the mechanical part of physic, "*quod in therapeia mechanicum;*" but although this has obtained the assent of so eminent a modern surgeon as Richerand, of Paris, I believe few on this side of the water will be of his opinion. As Mr. J. Pearson has observed: "Many people have imagined that when a man has learnt the art of dressing sores, of applying bandages, and performing operations with a little dexterity, he must necessarily be an accomplished surgeon. If a conclusion so gross and fallacious had been confined to the vulgar and illiterate, the progress of scientific surgery would have suffered little interruption; but if young minds are directed to these objects, as the only important matters upon which their faculties are to be exercised; if the gross informations of sense constitute the sum of their knowledge, little more can be expected from such a mode of study, than servile imitation, or daring empiricism. Indeed, some people have affected to oppose surgery as an *art*, to medicine as a *science*; and if their pretensions were justly founded, the former certainly would be degraded to a mere mechanical occupation. But it is not very easy to comprehend the grounds of such a distinction. The internal and external parts of the body are governed by the same general laws during a state of health; and if an internal part be attacked with inflammation, the appearances and effects will bear a great similarity to the same disease situated externally; nor are the indications of cure, in general, materially different. If by science, therefore, be meant 'a knowledge of the laws of nature,' he who knows what is known of the order and method of nature, in the production, progress, and termination of surgical diseases, merits as justly the title of a scientific practitioner as the well educated physician. The practical parts of physic and surgery are very frequently disunited, but their theory and principles are indivisible, since they truly constitute one and the same science."

As a learned Professor notices, the limits between physic and surgery are not very precisely marked, and the respective functions of the physician and surgeon, long as those names have existed, are still but very inaccurately defined. "The most superficial acquaintance with the symptoms, progress, and termination of the various morbid affections to which the human body is liable, must be sufficient to convince every unprejudiced inquirer, that there is but a slight foundation, if indeed there be any, for this distinction, in the nature of the diseases, which these practitioners are required to treat, or in the modes of treatment, by which the diseases themselves

may be cured, or relieved. Experience has long shown, that the use of internal remedies is not only required in a large proportion of the diseases, which are regarded as strictly surgical, but also, that there are few diseases which come under the care of the physician, in which morbid affections, requiring the manual aid, or practical skill of the surgeon, do not frequently occur.

“The treatment of febrile and internal inflammatory diseases, it will be allowed, belongs exclusively to the province of the physician wherever the distinction between physician and surgeon has been introduced, and is rigidly observed; yet in some species of fevers, and in all internal inflammatory diseases, blood-letting is often the principal, if not the only, remedy that is required. But this is an operation, however urgent the necessity for it be, which from engagement the physician can not, and, from the fear of degrading his province of the profession, will not perform. Retention of urine not unfrequently takes place in symptomatic febrile diseases, and this is an affection which does not always yield to the use of internal remedies; but it is an affection also, from the painful uneasiness which it immediately excites, as well as from the danger which it threatens, that will not admit of delay. When internal remedies, therefore, fail in relieving the patient, the urine must be speedily drawn off by means of a surgical operation: otherwise inflammation, mortification, and rupture of the bladder, must necessarily ensue. Febrile and internal inflammatory affections terminate not unfrequently in the formation of fluids, which it is necessary to let out by a surgical operation; and abscesses, fistulous openings, and ulcers are formed, which require the aid of the surgeon. In patients, also, affected with severe febrile diseases, from being long fixed down to their beds in one position, some of the parts of the body, upon which they rest, occasionally acquire a disposition to mortify, larger or smaller portions of the skin and subjacent cellular membrane becoming dead, separate from the living parts; and sores are formed, which are but too often the subject of unavailing surgical practice. To employ, in the different stages of this species of mortification, from its first commencement to the complete separation of the dead parts, and the formation of a new skin, the appropriate external and internal remedies, requires a greater share of surgical skill than can reasonably be expected in those who make a profession solely of physic. Unhappy, therefore, must be the lot of that patient, who in circumstances similar to those which I have described, has the misfortune to have for his sole medical attendant a physician ignorant of surgery.

“But, continues Professor Thomson, if a knowledge of surgery be necessary to the student who intends to practise physic, the knowledge of physic, on the other hand, is no less necessary to him who intends to devote his attention exclusively to the profession of surgery; for, indeed, there are few

chirurgical diseases, which are not in some period or another of their existence, accompanied by morbid affections of the same nature with those which fall properly, and most frequently under the care of the physician. It will only be necessary to mention, as examples of these affections, the symptomatic fever, which attends inflammation, whether this affection has been induced by external injury, or has occurred spontaneously in the body from internal disease; the hectic fever, supervening to long continued processes of suppuration; the febrile state, and other morbid affections, which are sometimes brought on by the too sudden and injudicious use of mercury; bilious fevers, and the various derangements of the digestive organs, which are sometimes the cause, and at other times the consequence, of local diseases; the nervous affections, such as apoplexy, convulsions, paralysis, and mania, which arise not unfrequently from injuries of the head; and locked jaw, or tetanus, which, in warm climates particularly, is so very liable to be induced by punctured wounds. These are morbid affections, the proper study and treatment of which, when they occur without local injury, are supposed to belong to the physician, rather than the surgeon; but occurring very frequently as they do in chirurgical diseases, and always modifying, or aggravating the effects of these diseases, ignorance of their nature, relations, and modes of cure, is not only inexcusable, but highly criminal in the practitioner who ventures to undertake their treatment."

From what has been stated, I think it very certain that there never can be a complete scientific division of the healing art into physic and surgery; and that all attempts to distinguish the numerous diseases and injuries of the human body into medical and surgical cases, must, in a great measure, be decided by custom, and the mutual agreement of practitioners, rather than by any rules, or principles, which are at all consistent.

In the earliest periods, the same men cultivated the whole field of medicine. The writings of Hippocrates, Galen, Celsus, Paulus Œgineta, Albucasis, &c. prove, that the Greeks, Romans, and Arabians never had an idea of the human body being susceptible of only two classes of diseases, one of which formed the province of physic, while the other constituted a separate and distinct science called surgery. All these ancient authors treat successively of fevers, fractures, wounds, and nervous diseases, and none of them appear to have supposed that there could be any disorders which really deserved to be called *external* and others *internal*. Nor was it until the middle of the twelfth century, that the ecclesiastics were restrained from undertaking any bloody operation. Surgery was then rejected from the universities, under the empty pretext, "*Ecclesia abhorret a sanguine*," often expressed, in its decrees, as Professor Thomson well observes, but never acted upon, except in this instance, by the church of Rome. It is to this epoch that we must refer the true separation of physic from

surgery; the latter being abandoned to the laity, who, in those ages of barbarism, were totally illiterate.

It is an observation made by the celebrated Bichat, that two things are essentially necessary to form a great surgeon, viz. genius and experience. One traces for him the way; the other rectifies it; both reciprocally assist in forming him. Without experience, genius would be unprofitably fertile; without genius, experience would only be a barren advantage to him. Out of the large number of hospital surgeons, who are to be met with in every country of Europe, and who enjoy ample opportunities of profiting by the lessons of experience, how few distinguish themselves, or ever contribute a mite to the improvement of their profession! Opportunity, without talents and an aptness to take advantage of it, is not of more use than light to a blind man. On the other hand, splendid abilities, without experience, can never be enough to make a consummate surgeon, any more than a man with the greatest genius for painting can excel in his particular art without having examined and studied the real objects which he wishes to delineate. In short, as a sensible writer has remarked, "*Les grands chirurgiens sont aussi rares, que le génie, le savoir, et les talens.*"

The description of the qualities which a surgeon ought to possess, as given by Celsus, is excellent as far as it goes. A surgeon, says he, should be young, or, at any rate, not very old; his hand should be firm and steady, and never shake; he should be able to use his left hand with as much dexterity as his right; his sight should be acute and clear; his mind intrepid and pitiless, so that when he is engaged in doing any thing to a patient, he may not hurry, nor cut less than he ought, but finish the operation just as if the cries of the patient made no impression upon him.

By the word "*immisericors*," as Richerand has observed, Celsus did not mean that a surgeon ought to be quite insensible to pity; but that, during the performance of an operation, this passion should not influence him, as all emotion would then be mere weakness. This undisturbed coolness, which is still more rare than skill, is the most valuable quality in the practice of surgery. Dexterity may be acquired by exercise; but firmness of mind is a gift of nature. Haller, to whom nature was so bountiful, in other respects, was denied this quality, as he candidly confesses. "Although, says he, I have taught surgery seventeen years, and exhibited the most difficult operations upon the dead body, I have never ventured to apply a cutting instrument to a living subject through a fear of giving too much pain."

Surgery may boast of having had an origin, that well deserves to be called noble: for the earliest practice of it arose from the most generous sentiment which nature has implanted in the heart of man, viz. from that sympathetic benevolence, which leads us to pity the misfortunes and sufferings of others,

and inspires us with an anxious desire to alleviate them. He who first saw his fellow creature suffer could not fail to participate in the pain, and endeavour to find out the means of affording relief. Opportunities of exercising this useful inclination were never wanting. In the first ages of the world, man in his destitute state was under the necessity of earning, by force or stratagem, a subsistence which was always uncertain, and in the combats into which this sort of life drew him, he frequently met with wounds and other injuries. Wherever the chase was in vogue as a means of livelihood, or amusement; wherever broils and contests occasionally arose; and man was the same animal he now is, liable to various diseases and accidental hurts, there must have existed a necessity for surgery; nor can there be a doubt, that the origin of this valuable practice is as ancient as the exposure of mankind to several of the same kinds of injuries, as befall the human race at the present day. At length wars became more frequent and extensive; wounds were consequently multiplied; and the necessity for surgical assistance was increased, and its value enhanced.

In fact, among the ancients, the profession of medicine and surgery constituted a sacred kind of occupation, and the practice of it belonged only to privileged persons. *Æsculapius* was the son of *Apollo*. In the armies, the highest princes gloried in dressing the wounds of those who had fought the battles of their country. Amongst the Grecians, *Podalirius*, *Chiron*, and *Machaon*, were not only distinguished for their valour, but also for their skill in surgery, as we learn from the poem of the immortal *Homer*. The value which was placed upon the services of *Machaon* by the Grecian army may well be conceived from the anxiety which they evinced to have him properly taken care of when he was wounded in the shoulder with a dart. "O *Nestor*, pride of Greece, (cries *Idomeneus*) mount, mount upon thy chariot! and let *Machaon* mount with thee! Hasten with him to our ships; for a warrior, who knows, as he does, how to relieve pain, and cure wounds, is himself worth a thousand other heroes." *Hippocrates* was one of the first citizens of Greece; he nobly refused all the rich offers of several kings, enemies of his country, to entice him into their service; and, in particular, he disdained to accept those of *Xerxes*, whom he regarded as a barbarian.

It is in the immortal poems of the *Iliad* and *Odyssey*, that we find the only certain traditions, respecting the state of the art, before the establishment of the republics of Greece, and even until the time of the Peloponnesian war. There it appears that surgery was almost entirely confined to the treatment of wounds, and that the imaginary power of enchantment was joined with the use of topical applications.

In the cures, recorded in the sacred writings of the Christian religion, the intervention of a supernatural power is always combined with what is within the scope of human possibility. The same character evinces itself in the infancy of the art in

every nation. The priests of India, the physicians of China and Japan, and the jugglers of the savage or half-civilized tribes of the old and new continents, constantly associate with drugs and manual operations certain mysterious practices, upon which they especially rely for the cure of their patients. Such was also, no doubt, the character of the medicine of the Egyptians, in the remote times, previous to the invention of the alphabet, and upon which so very little light is now thrown.

It is curious, however, to find, from some late observations made by the men of science, who accompanied the French expedition to Egypt, in 1798, that amongst the ruins of ancient Thebes there are documents, which fully prove that surgery in the early times of the Egyptians, had made a degree of progress, of which few of the moderns have any conception. It is noticed by Larrey, that, when the celebrated French General Desaix had driven the Mamalukes beyond the Cataracts of the Nile, the Commission of Arts had an opportunity of visiting the monuments of the famous Thebes, and the renowned temples of Tentyra, Karnack, Medynet Abou, and Luxor, the remains of which still display their ancient magnificence. It is upon the ceilings and walls of these temples that basso-relievos are seen, representing limbs that had been cut off with instruments very analogous to those which are employed at the present day for amputations. The same instruments are again observed in the hieroglyphics, and vestiges of other surgical operations may be traced, proving that, in these remote periods, surgery had made some considerable progress.

We next come to the epoch when, by the union and arrangement of scattered facts, the science truly arose. Hippocrates, born in the island of Cos, four hundred and sixty years before the common æra, collected the observations of his predecessors, added the results of his own experience, and composed his first treatises. In the hands of this great genius, medicine and surgery did not make equal progress. The former reached the highest degree of glory. Hippocrates drew up the history of acute diseases in so masterly a style, that twenty past centuries have hardly found occasion to add any thing to the performance. But surgery was far from attaining the same degree of perfection. The religious veneration for the asylums of the dead, and the impossibility of dissecting the human body, formed an insurmountable obstacle to the study of anatomy. An imperfect acquaintance with the structure of animals, reputed to bear the greatest resemblance to man, could only furnish venturesome conjectures, or false inferences. These circumscribed notions sufficed for the study of acute diseases. In these cases, the attentive observation of strongly marked symptoms, and the idea of the operation of a salutary principle, derived from remarking the regular succession of such symptoms, and their frequently beneficial termination, enlightened the physician in the employment of cura-

tive means; while surgery, deprived of the assistance of anatomy, was too long kept back in an infant state. Whatever praises may have been bestowed on those parts of the works of Hippocrates particularly relating to surgery, when compared with his other acknowledged legitimate writings, they appear only as the rough sketches of a picture by a great master.

Excepting the fragments, collected or cited by Galen, we possess no work written by any of the successors of Hippocrates until the period of Celsus; which leaves a barren interval of almost four centuries. In this space lived Erasistratus, as well as Herophilus, celebrated for the sects which they established, and particularly for having been the first who studied anatomy upon the human body.

Celsus lived at Rome in the reigns of Augustus, Tiberius, and Caligula. He appears never to have practised the healing art, on which, however, he has written with much precision, elegance, and perspicuity. His work is the more precious, inasmuch as it is the only one, which gives us information, with regard to the progress of surgery in the long interval between Hippocrates and himself. The four last books, and especially the seventh and eighth, are exclusively allotted to surgical matter. The style of Celsus is so elegant, that he has generally been regarded quite as the Cicero of medical writers, and long enjoyed high reputation in the schools. His surgery was entirely that of the Greeks, notwithstanding he wrote at Rome: for, in that capital of the world, physic was then professed only by persons who had either come from Greece, or had received instruction in the celebrated schools of this native soil of all the arts and sciences.

Let us pass over the interval which separates Celsus and Galen. This latter was born at Pergamus in Asia Minor, and came to Rome in the reign of the emperor Marcus Aurelius. He practised surgery and physic there about the year 165 of the Christian era. These two sciences were at that time still united, and though some writers of much earlier date speak of the division of physic into dietetical, chirurgical, and pharmaceutical, no such distinction was followed in practice. As Galen had been a surgeon at Pergamus, he continued the same profession at Rome; but, being soon attracted by the predominating taste of the age in which he lived, to a science, which more easily yields to the systems and dazzling speculations of philosophical sects, he afterwards neglected surgery which strictly rejects them. His writings prove, however, that he did not abandon it entirely. His commentaries on the treatise of Hippocrates, *De Officina Medici*, and his essay on bandages, and the manner of applying them, show that he was well versed even in the minor details of the art. Besides, it is known, that he paid great attention to pharmacy, and in his work upon antidotes, chap. 13, he tells us himself, that he had a drug shop in the Via Sacra, which fell a sacrifice to the flames

that destroyed, in the reign of Commodus, the Temple of Peace, and several other edifices.

To Galen succeeded the compiler Oribasius, Œtius of Amida, a physician, who lived towards the close of the fifth century, Alexander of Tralles, and Paulus Œgineta, so called from the place of his birth, though he practised at Rome and Alexandria. Paulus collected into one work, still justly esteemed, all the improvements which had been made in surgery up to his own time. He concludes the series of Greek and Roman physicians, and may be looked upon as the last of the ancients, unless it be wished to let the Arabians have a share in the honours of antiquity. "He appears," says Portal, "to be one of those unfortunate writers, to whom posterity has not done justice. It seems as if he had been decried without having been read; for if pains had been taken to examine his works, he would neither have been regarded as a mere copyist, nor been called the 'ape of Galen,' with whom he does not always coincide. Nay, in some places, he ventures to oppose the doctrines of Hippocrates. He was perfectly acquainted with the practice of the ancients, and when he agrees with, or differs from them, it is not from a spirit of contradiction, but because the reasons, which led him to take one side, or the other, appeared to him well founded." All now agree, that surgery is much indebted to him. Afterwards the downfall of surgery followed that of all the other sciences, and from the capture of Alexandria by the Saracens under Amrou, viceroy of Egypt, 641, until the end of the tenth century, nothing prevailed but the dark clouds of ignorance and barbarism. The Arabians, who became masters of a great part of the Roman empire, dug up the Greek manuscripts, which lay buried under the ruins of the libraries; translated them; appropriated to themselves the doctrines which they contained; impoverished them with additions; and transmitted to posterity only enormous compilations. In a word, such are the treatises of Rhazes, Hali-Abbas, Avicenna, Averrhoes, and Albucasis, the most celebrated of the Arabian authors. Inventors of a prodigious number of instruments and machines, they appear to have calculated the efficacy of surgery by the richness of its arsenals, and to have been more anxious to inspire terror, than confidence. As an instance of the cruelty of their methods, I shall merely notice, that, in order to stop the bleeding after amputation, they plunged the stump in boiling pitch.

The fate of medicine was not more fortunate. In vain, the school of Salernum, founded about the middle of the seventh century, made some attempts to revive its splendour. As a modern writer observes, medical science, seated on the same benches, where the doctrine of Aristotle, accommodated to religious opinions, was the subject of endless controversies, imbibed, as it were, by contagion, the argumentative and sophistical mania, and became enveloped in the dark hypotheses of scholastic absurdity.

The universal ignorance, continues this author, the pretended horror of blood—the dogma of a religion, which shed it in torrents for useless quarrels; an exclusive relish for the subtleties of the school, and speculative theories, are circumstances, further explaining the profound darkness which followed these empty labours. About the middle of the twelfth century, (1163,) the Council of Tours prohibited the ecclesiastics, who then shared with the Jews the practice of medicine in christian Europe, from undertaking any bloody operation. It is to this epoch, that the true separation of medicine from surgery must be referred. The latter was abandoned to the laity, the generality of whom, in those ages of barbarism, were entirely destitute of education. The priests, however, still retained that portion of the art, which abstained from the effusion of blood. Roger Rolandus, Bruno, Gulielmus, de Salicetus, Lanfranc, Gordon, and Guy de Chauliac, confined themselves to commentaries on the Arabians, and if the latter author be excepted, they all disgraced surgery by reducing it nearly to the mere business of applying ointments and plasters. Guy de Chauliac, however, the last of the Arabians, is to be honourably excluded from such animadversion. His work written at Avignon, in 1363, in the pontificate of Urban the fifth, to whom he was physician, continued to be, for a long while, the only classical book in the schools. It may be observed, that as he imitated in every respect the other Arabian physicians, and like them thought, that it did not become an ecclesiastic to deviate from the austerity of his profession, he passed over in silence the diseases of women.

At length, Antonio Beneveni, a physician of Florence, began to insist upon a truth, of the highest importance to the extension of surgical knowledge, viz. that the compilations of the ancients and Arabians ought to be relinquished for the observation of nature. A new era now began. The moderns were convinced, that by treading servilely in the footsteps of their predecessors, they should never even equal, much less surpass them. The labours of Vesalius also gave birth to anatomy, illuminated by which science, surgery put on quite a different appearance in the hands of Ambrose Paré, the first and most eminent of the French surgeons. For the credit of Italy, however, it should be recorded, that the sensible writings published in that country prior to the time of Paré, had the greatest influence in creating a due sense of the value and importance of surgery, and in disposing men of talents and education to cultivate it as a liberal profession.

Obeying the dictates of his genius, Paré either compelled authority to yield to observation, or endeavoured to reconcile them. However, his superior merit soon excited the ignorant, the jealous, and the malignant against him; he became the object of a bitter persecution; and his discoveries were represented as a crime. Although he was the restorer, if not the inventor, of the art of tying the blood-vessels, the power of

his persecutors compelled him to make imperfect extracts from Galen, and alter his text, in order to rob himself, in favour of the ancients, of the glory which this distinguished improvement deserved.

Surgeon of King Henry the second, Francis the second, Charles the ninth, and Henry the third, of France, Paré practised his profession in various places, followed the French armies into Italy, and acquired such esteem, that his mere presence in a besieged town, was enough to reanimate the troops employed for its defence. In the execrable night of Saint Bartholomew, his reputation saved his life. As he was of the reformed religion, he would not have escaped the massacre, had not Charles the ninth himself undertaken to protect him. The historians of those days have preserved the remembrance of this exception, so honourable to him who was the object of it; but which should not diminish the just horror, which the memory of the most weak and cruel tyrant must ever inspire. “*Il n’en voulut jamais sauver aucun, says Brantome, sinon maistre Ambroise Paré, son premier chirurgien, et le premier de la chrétieneté; et l’envoya querir et venir le soir dans sa chambre et garderobe, lui commandant de n’en bouger; et disait qu’il n’était raisonnable qu’un qui pouvait servir à tout un petit monde, fût ainsi massacré.*”

Ambrose Paré was not content, like his predecessors, with exercising his art with reputation; he did not follow the example of the Quatre-Maîtres of Pitard, so justly celebrated for having composed the first statutes of the College of Surgeons at Paris, in the reign of St. Lewis, whom he had attended in his excursions to the Holy Land; and of several other surgeons, the fruits of whose experience were lost to their successors. Paré transmitted the result of his own experience in a work that will remain immortal.

His writings, so remarkable for the variety and number of facts in them, are eminently distinguished from all those of his time, inasmuch as the ancients are not looked up to in them with superstitious blindness. Freed from the yoke of authority, he submitted every thing to the test of observation, and acknowledged experience alone as his guide. The French writers are with reason proud of their countryman Paré to this day: they allege, that he must ever hold amongst surgeons the same place that Hippocrates occupies amongst physicians. Nay, they add, that, perhaps, there are none either of the ancients, or moderns, who are worthy of being compared with him.

After the death of this great man, surgery, which owed its advancement to him, continued stationary, and even took a retrograde course. This circumstance is altogether ascribable to the contemptible state, into which those who professed the art fell, after being united to the barbers by the most disgraceful association.

Pigrai, the successor of Ambrose Paré, was far from being

an adequate substitute. A spiritless copier of his master, he abridged his surgery in a Latin work, where the unaffected graces of the original, the sincerity, and the ineffable charm, inseparable from all productions of genius, entirely disappeared. He received, however, equal praise from his contemporaries; doubtless, because he filled a high situation: but, as Richerand remarks, his name, which is to-day almost forgotten, proves sufficiently, that dignities do not constitute glory.

Rousset and Guillemeau distinguished themselves, however, in the art of midwifery; while Covillard, Cabrol, and Habcot enriched surgery with a great number of curious observations.

In the next or seventeenth century, a fresh impulse produced additional improvements. Then appeared in Italy, Cæsar Magatus, who simplified the treatment of wounds, Fabricius ab Aquapendente, even less praiseworthy as a surgeon, than a physiologist, and Marcus Aurelius Severnius that restorer of active surgery. Amongst the English surgeons flourished Wiseman, who was the Paré of England; and William Harvey whose discovery of the circulation of the blood had such an influence over the advancement of medical science in general, and that of surgery in particular, that he must be classed among the principal improvers of the latter profession. In Germany, Fabricius Hildanus, who was far superior as a surgeon to the Italian Fabricius; Scultetus, so well known for his work, entitled *Armamentarium Chirurgicum*; and Purmann and Solignen, who had the fault of being too partial to the use of numerous complicated instruments.

Holland, restored to liberty by the generous exertions of its inhabitants did not long remain a stranger to the improvement of surgery. This nation, so singular in many respects, presents us with one particularity which claims the notice of a medical historian. Ruysch, who was an eminent anatomist, and merits equal celebrity for his *Obs. Anatomico-Chirurgicarum Centuriæ*, carried with him to the grave the secret of his admirable injections. Roonhuysen also made a secret of his lever, which, before the invention of the forceps, was the only resource in difficult labours. Raw, who successfully cut fifteen hundred patients for the stone, took such pains to conceal his manner of operating, that Heister and Albinus, his two most distinguished pupils, have each given a different explanation of it. Such a disposition, which is extremely hurtful to the advancement of medical and surgical knowledge, would materially have retarded the progress of surgery in Holland, had not Camper, in the following century, effaced the imputation by the great number of his discoveries, and his zealous desire to render them public.

While great improvements were going on in Italy, England, and Holland, surgery languished in a humiliated state in France. The accoucheur Mauriceau, Dionis, Saviard, and Belloste, were the only French surgeons of note, who could be contrasted with so many distinguished men of other nations.

Richerand observes, that the splendid days of Louis the fourteenth were an iron age for discouraged surgery. And yet this monarch seems to have been personally interested in the melioration in this important art; for he was very nearly falling a victim to a surgical disease, a fistulo in ano, and was not cured till after a great number of blundering operations, and useless experiments.

Chronology teaches simply the history of dates. In the study of the sciences, the only method of impressing the memory with facts, consists in connecting the epoch of them with the learned men by whom they have been illustrated. But, the greatest surgeons of the eighteenth century have not altered the face of their profession, although they have powerfully contributed to its advancement. In surgery, as an author has remarked, some feeble rays always precede brilliant lights, and it approaches perfection in a very gradual way. In the last century, however, amongst the distinguished surgeons of France, there are two of extraordinary genius, round whom, as it were, all the others might be grouped and arranged, and whose names deserve to be affixed to the two most brilliant epochs of French surgery. These are first J. L. Petit, whose glory was shared by the Academy of Surgery; and secondly, the celebrated Desault.

It is not with surgery, as with physic, strictly so called; the epochs of the latter are distinguished by hypotheses; while those of surgery are marked by discoveries. The eminent men, in this last branch of the profession have not, like the most renowned physicians, created sects, built systems, destroyed those of their predecessors, and constructed a new edifice, which, in its turn, has been demolished by other hands. All of them have been satisfied with combating ancient errors, discovering new facts, and continuing their art, the sphere of which they have enlarged by their discoveries, without making it bend under the yoke of systems, which it would have ill supported. To this steady and uniform course, says Richerand, which is a striking proof of the superiority of surgery, and of the certainty and invariableness of its principles, shall we oppose the numerous revolutions of physic? The christian religion, which abounds in sects, has not a greater number of them than physic. "Naturistes, solidistes, humoristes, vitalistes, animistes, semi-animistes, mécaniciens, chimistes; le plus grand nombre des médecins honore Hippocrate d'un culte presque superstitieux; ceux-ci marchent sous les bannières de Staahl; ceux-la s'appuient du grand nom de Boerhaave; tels autres invoquent Sydenham, Hoffmann, Stoll, absolument comme les theologiens combattent pour Luther, Zuingle, Calvin ou Jansen."

The elogy on J. L. Petit, delivered in the midst of the Royal Academy of Surgery, of which he was one of the first and most distinguished members, represents him as blending the study of anatomy with his amusements when a boy; and ar-

dently seeking every opportunity to increase his knowledge by observation. He had had experience enough to publish at an early period of his life his *Traité sur les Maladies des Os*; a work, which for a century was esteemed the best upon the subject. His success was most virulently opposed by the envious critics; and it was not till after more than thirty years of academical labours and extensive practice, that he was unanimously chosen the head of his associates. This acknowledged superiority, however, was the more flattering, as the honour was obtained at a period when surgery was in a flourishing state in France, and when Petit held no office, from which he could derive an influence foreign to his personal merit. While Mareschal, La Peyronie, and La Martiniere, assured him of the royal favour, Quesnay, Morand, and Louis, who corrected his writings, made him speak a language which does honour to that famous collection, to which he contributed his observations, and in which, if some theoretical explanations be put out of consideration, nothing has lost its value by age. J. L. Petit was also the author of a "*Traité des Maladies Chirurgicales et des Operations qui leur conviennent*;" a production that will always stand high in the estimation of the judicious surgeon.

The history of this epoch, so glorious for the profession of surgery, is completely detailed in the Memoirs and Prizes of the Royal Academy of Surgery; a work which is absolutely indispensable, and the various parts of which can not be too often considered. In it are preserved the labours of Mareschal, Quesnay, La Peyronie, Morand, Petit, De La Martiniere, Le Dran, Garengeot, de la Faye, Louis, Verdier, Foubert, Hevin, Pibrac, Fabre, Le Cat, Bordenave, Sabatier, Puzos, Levet, and several other practitioners, who, though less famous, contributed by their exertions and knowledge to form this useful body of surgical facts. Many of the preceding surgeons also distinguished themselves by other productions, which, however, I shall not here enumerate.

To the foregoing list of eminent French surgeons must be added, the names of La Motte, Maître-Jean, Goulard, Daviel, Ravaton, Mejean, Pouteau, David, and Frère Come.

While surgery was thus advancing in France, other nations were not neglectful of it. At this period, flourished in England, White, Cheselden, Douglas, the two Monros, Sharp, Cowper, Warner, Alanson, Percival Pott, Hawkins, Smellie, and the two Hunters.

But, of all these eminent men, none contributed more powerfully than Mr. Percival Pott, to the improvement of the practice of surgery in England. His life, indeed, forms a sort of epoch in the history of the profession. Before his inculcations and example had produced a desirable change, the maxim of "*dolor medicina doloris*," as we learn from Sir James Earle, remained unrefuted. The severe treatment of the old school, in the operative part and in the applications, continued

in force. The first principles of surgery, the natural process and powers of healing, were either not understood, or not attended to; painful and escharotic dressings were continually employed; and the actual cautery was in such frequent use, that at the times when the surgeons visited the hospital, it was regularly heated, and prepared as a part of the necessary apparatus. Where shall we find more sensible, or more truly practical observations on the treatment of abscesses, than in his excellent treatise on the fistula in ano? Where shall we meet with better remarks on the local treatment of gangrenous parts, than in his valuable tract on the mortification of the toes and feet? What author abounds with so many just observations on the injuries of the head, blended, it is true, with rather too great a partiality to the trepan, the so frequent necessity for which is now less generally acknowledged? His description of the inflammation and suppuration of the dura mater, and of the treatment, is matchless. The account which he has left us of the disease of the vertebræ, attended with paralysis of the limbs, is perhaps his most original production. His celebrated essay on fractures, was also very original, and has had in this country considerable influence over the treatment of these injuries; but, there can now be no doubt, that the effects of position were exaggerated in this part of his writings, and that surgeons ought still to make every possible exertion to render their apparatus for broken bones more effectual. A more really valuable production of this eminent surgeon is his remarks on amputation. The necessity for that operation in certain cases is there convincingly detailed; and the most advantageous period for its performance clearly indicated. The urgency for its prompt execution, after particular injuries, he has indeed so perfectly explained, that the late inculcations on the subject by Larrey, and several other modern surgeons, appear to be in a great measure anticipated; the only difference being that Pott's remarks applied principally to compound fractures, while Larrey's refer to gun-shot wounds. All these, however, are cases of accidental violence, and, of course, should be treated upon the same general principles.

A longer comment on the writings and improvements of Percival Pott would here be requisite to do him every degree of justice; but his name, advice, and opinions are so well known, that I shall be excused for not saying any thing more in the present place, than that he was in his time the best practical surgeon, the best lecturer, the best writer on surgery, and the best operator, of whom England could boast.

Another character of still greater genius and originality, though of inferior education, was the ever memorable John Hunter, surgeon to St. George's Hospital, who was at once eminent as a surgeon, an anatomist, a physiologist, a naturalist, and philosopher. If Pott materially improved many parts of the practice of surgery in England, and evinced himself to be the most skilful operator of his time, John Hunter was also not less importantly employed in extending the bounda-

ries of physiological knowledge, and in the investigation of human, and particularly comparative anatomy. The knowledge which he derived from his favourite studies, he constantly applied to the improvement of the art of surgery, and he omitted no opportunity of examining morbid bodies, whereby he collected facts, which are invaluable, as they tend to explain the real causes of the symptoms of numerous diseases.

In the practice of surgery, whenever operations proved inadequate to their intention, Mr. Hunter always investigated with uncommon zeal the causes of ill success, and in this way, he detected many fallacies, as well as made some important discoveries in the healing art. He ascertained the cause of failure, common to all the operations in use for the radical cure of the hydrocele, and was enabled to propose a mode of operating attended with invariable success. He ascertained, by experiments and observations, that exposure to atmospherical air, simply, can neither produce, nor increase inflammation. He discovered in the blood so many phenomena, connected with life, and not to be referred to any other cause, that he considered it alive in its fluid state. He improved the operation for the fistula lacrymalis, by removing a circular piece of the os unguis, instead of breaking it down with the point of a trocar. He explained better than any of his predecessors, all the highly interesting modern doctrines, relative to inflammation, union by the first intention, suppuration, ulceration, and mortification. His writings also throw considerable light on the growth, structure, and diseases of the teeth. As instances of his operative skill, it deserves to be mentioned, that he removed a tumour from the side of the head and neck of a patient at St. George's Hospital, as large as the head, to which it was attached; and by bringing the cut edges of the skin together, the whole wound was nearly healed by the first intention. He likewise dissected out of the neck a tumour, which one of the best operators in England had declared, rather too strongly, that no one but a fool, or a madman, would meddle with; and the patient got perfectly well. But, perhaps, the greatest improvement which he made in the practice of surgery, was his invention of a new mode of performing the operation for the popliteal aneurism, by taking up the femoral artery on the anterior part of the thigh, without opening the tumour in the ham. The safety and efficacy of this method of operating have now been fully established, and the plan has been extended to all operations for the cure of this formidable disease.

According to Sir Everard Home, Mr. Hunter was also one of the first who taught that the excision of the bitten part was the only sure mode of preventing hydrophobia; and he extended the time, during which this proceeding might be reasonably adopted, beyond the period which had been generally specified.

His researches into the nature of the venereal disease, and his observations on the treatment, will for ever be a lasting monument of his wonderful powers of reasoning and investigation. If he left some points of the subject doubtful and unsettled, he has admirably succeeded in the elucidation of others; and his work on this interesting disorder, is, with all its defects, the best which is yet extant.

Even the language and mode of expression of this great man were his own; for, so original were his sentiments, that they could hardly be delineated by any ordinary arrangement of words. His phrases are still adopted in all the medical schools of this country, and continue to modify the style of almost every professional book. Great as Mr. Hunter's merit as a surgeon was, it was still greater as a comparative anatomist and physiologist. The museum of the Royal College of Surgeons, and his papers in the *Phil. Trans.* will for ever attest his greatness in these characters.

At the period, when the preceding distinguished men upheld the character of their profession in Great Britain, Lancisi, Morgagni, Molinelli, Bertrandi, Guattani, Mascagni, Matani, Troja, and Moscati, were doing the same thing in Italy. Bertrandi's *Treatise on the Operations of Surgery*, and Troja's work on the *Regeneration of Bones*, are even at this day works of the highest repute. Of late years, the credit of the Italian surgeons has been honourably maintained, by Monteggia, Scarpa, Paletta, Quadri, Assalini, Morigi, and others. In Holland flourished Albinus, Deventer, Sandifort, and Camper; and, in Germany and the north of Europe, the immortal Haller, Heister, Platner, Røderer, Stein, Bilguer, Acrell, Callisen, Brambilla, Theden, Schmucker, and Richter. Also Arnemann, Weidmann, Beer, Soemmering, Creutzenfeldt, Hesselbach, Hufeland, Graëfe, Klein, Himly, Langenbeck, Walther, J. A. Schmidt, G. J. Beer, &c. should not be forgotten, several of whom are still pursuing their useful and honourable career. Be it also recorded as a part of the great merit of the Germans, that they now rank amongst the best and most minute anatomists; that they are zealous cultivators of comparative anatomy; that their industry allows no improvement in medical science, wherever made, to escape their notice; and that surgery is greatly indebted to them for the best descriptions of the diseases of the eye.

On the Continent, the Royal Academy of Surgery at Paris was long considered quite as the solar light of this branch of science. Nothing, indeed, contributed so materially to the improvement of surgical knowledge, as this establishment, a noble institution, which, for a long while, gave our neighbours infinite advantage over us, in the cultivation of this most useful profession. The French revolution, which, by a fatal abuse, involved in the same prohibition, both useful and pernicious societies, did not spare even this beneficial establishment, in which emulation and talents had been so long united

for the benefit of mankind. The various dissertations, published by its illustrious members, will serve as a perpetual memorial of the spirit, ability, and success with which its objects were pursued; and centuries hence, practitioners will reap from the pages of its memoirs the most valuable information. Although the Academy was deprived of the talents of Louis, who died a short time before its suppression, it yet had at this period several members, worthy of continuing its labours, and supporting its reputation: Sabatier, Desault, who may be regarded as the Pott of France, Chopart, Lassus, Peyrilhe, Dubois, Percy, Baudeloque, Pelletan, Sue, and others.

The Academy of Surgery in France was succeeded by what is named the *Ecole de Médecine*. Desault, who had been almost a stranger in the former, became quite the leading character in the latter. Several things recommended him strongly to the remembrance and admiration of posterity; the exactness and method, which he introduced into the study of anatomy: the ingenious kinds of apparatus which he invented for the treatment of fractures: a noble ardour in his profession, which he knew how to impart to all his pupils: his clinical lectures upon surgery, which were the first ever delivered; and the boldness and simplicity of his modes of operating. Indeed, such was his genius, that even when he practised only methods already understood, he did them with so much adroitness, that he rather appeared to be the inventor of them. From the *Ecole de Médecine* have issued Dupuytren, Boyer, Richerand, Dubois, Lheritier, Manoury, Lallemand, Petit de Lyon, Bichat, and others.

Amongst the public institutions in Europe for the improvement of medical and surgical knowledge, the present Medical and Chirurgical Society of London certainly stands pre-eminent, whether the reputation and number of its members, the importance of many of the papers which it has published, or the extent and value of its library, be taken as the criterion of the character, which is here assigned to it. Many of the facts, which it has collected and published, are of considerable practical importance, especially those relating to the subjects of aneurism, hemorrhage, the diseases of the joints, calculi in the bladder, and that least intelligible of all diseases, syphilis. Its library, which is already the most select, valuable, and complete collection of medical literature in Great Britain, more especially with reference to modern works, is continually receiving additions, both by large purchases at home and abroad, and by the numerous donations of its members and others. The intercourse and correspondence, which such a society always maintains amongst the innumerable, scattered members of the profession, can not fail to be attended with the most beneficial effects upon medical science in general: a generous and useful sort of emulation is thus kept alive; the spirit of inquiry is kept from slumbering; and every indi-

vidual, who ascertains a new fact, has now the means of making it known to the world, with all the expedition which its importance may demand. By this observation, I do not mean that it will always appear in print soon after its communication to the society; for that is a circumstance which must necessarily depend upon there being, or not, a sufficient quantity of interesting matter in the Society's possession to form an additional part to its Transactions; but the very reading of the paper at a public meeting, gives it immediate notoriety in the profession, and, if its novelty and merit be great, it soon excites very general attention.

The researches of Bichat, who quitted surgery, powerfully contributed to the advancement of physiological science. His mind, richly stored with the positive facts which he had learned in the study of surgery, conceived no less a project, than that of rebuilding the whole edifice of medicine. Some courses of lectures upon the *materia medica*, internal clinical medicine, and morbid anatomy, announced this vast design, which was frustrated by a premature death. Bichat, as a physiologist, and man of very original genius, may be considered as the John Hunter of France; but his qualities were of a different cast, and hardly admit of comparison with those of Hunter, whose investigations were not limited to man, but extended to the whole chain of animated beings. Bichat died in the midst of his labours, and in dying, his greatest regret was that of not having completed them. His example, says Richerand, proves most convincingly what Boerhaave always inculcated, and every man of experience knows, how indispensable the study and even the practice of surgery are to him, who would wish to be distinguished and successful physicians.

In the course of the last thirty years, great and essential improvements have been made in almost every branch of surgery.

Before the time of Mr. Hunter, our ideas of the venereal disease were surrounded with absurdities; and it is to this luminary that we are in an eminent degree indebted for the increased discrimination and reason which now prevail, both in the doctrines and treatment of the complaint. It must be confessed, however, that much yet remains to be made out, respecting the nature and treatment of syphilitic disorders. Need I mention a greater proof of the truth of this remark, than the remarkable change of practice in some of the principal hospitals in London, mercury being now exhibited in not more than one out of every eight or ten cases, for which this medicine a few years ago was always deemed indispensable? Numerous cases, having all the characters of primary venereal sores, seem also now to be curable by simple dressings and cleanliness; and the necessity for violent salivation, in any cases, begins now to be generally disbelieved. In short, so different is every thing from what it used to be, that many

surgeons are tempted to suppose the nature of the venereal disease totally altered.

Strictures in the urethra, an equally common and distressing disease, were not well treated of before Mr. Hunter published on the venereal disease. Until his time, we were unacquainted with a good practical method of applying caustic within the urethra, a method which has been still further perfected with the armed bougies, invented by Sir Everard Home. The latter gentleman, indeed, has taken a very scientific view of the whole subject, and, perhaps, his only error is that of not having sufficiently limited a plan of treatment, which may sometimes be preferable to all others.

In modern times, hernial diseases, those common afflictions in every country, have received highly interesting elucidations from the labours of Pott, Camper, Richter, Sir Astley Cooper, Hey, Gimbernat, Hesselbach, Scarpa, Lawrence, Langenbeck, Cloquet, and others.

The treatment of injuries of the head has been materially improved by Quesnay, Le Dran, Pott, Hill, Desault, and Abernethy.

The disease of the vertebræ, which occasions paralysis of the limbs, formerly always baffled the practitioner; but the method, proposed by Mr. Pott, is now frequently productive of considerable relief, and sometimes of a perfect cure. The diseases of the joints in general, may also be said to be at present viewed with much more discrimination, than they were a very few years ago; and this great step to better and more successful practice, reflects great honour on Mr. Brodie, while it keeps up a well-founded hope, that morbid anatomy, the study, which has of late banished so much of confusion from this part of surgery, will yet be the means of bringing to light other useful facts and observations relating to the pathology of the joints.

In the time of Mr. Pott, few patients, afflicted with lumbar abscesses, ever recovered; for soon after a free opening had been made, according to the method then in vogue, the constitution was usually seized with violent irritative fever, which hardly admitted of any control. Mr. Abernethy ascertained, that much of this risk might be avoided by making only a small opening, healing it by the first intention, after the matter had been let out, and then repeating the same plan from time to time, so as to prevent the cavity of the abscess from ever being distended, and give it the opportunity of diminishing by a natural process. Of course, success can not be expected to attend even this treatment, when the vertebræ are carious, or any other serious organic disease prevails.

The almost infallible plan of curing hydroceles by means of an injection, as described by Sir James Earle, may be enumerated as one of the most decided improvements in modern surgery: at least, no doubt is entertained on this point by any surgeon of eminence in France, the British dominions, or the United States.

The increasing aversion to the employment of the gorget in lithotomy, the many distinguished advocates for the use of better instruments, and, above all things, the clear exposition of the right principles of the operation, now made, both by lecturers and authors, I regard as an agreeable indication of the augmented degree of success with which lithotomy is now likely to be practised, in every fair case for the operation. The urethral-forceps, recommended by Sir A. Cooper, for removing calculi through the urethra, and Dr. Civiale's ingenious apparatus, called a lithonriptor, designed to reduce the stone to powder, so that it may be voided with the urine through the urethra, (each plan thus superseding, when it answers, all occasion for lithotomy) are great and signal improvements, which entitle their inventors to a distinguished rank amongst those men of genius, from whose labours the present and future generations will receive inestimable benefit.

The diseases of the eyes, to which English surgeons seemed to pay much less attention than was bestowed by foreign practitioners, now obtain due attention in Britain. Although they have always had what are called oculists, their regular surgeons have generally been wonderfully ignorant of this part of their profession, and uninformed on the subject, they have given up to professed oculists and quacks one of the most lucrative and agreeable branches of practice. However, the able writings of Daviel, Wenzel, and Ware, begin now to be familiarly known to practitioners: and the observations of Scarpa, Richter, Beer, Schmidt, Himly, Wardrop, Travers, Saunders, and Guthrie, will soon have immense effect in diffusing in the profession a due knowledge of the numerous diseases to which the organs of vision are liable. As likewise the hospital surgeons of London, long and grossly neglected the study of these cases, and conscientiously refused to have any thing to do with them, the public at length saw the necessity of establishing Eye Infirmarys, where such afflictions might be more attentively observed and relieved. Some of these have now become excellent schools, in which the rising generation of surgeons have abundant opportunities of studying the nature of all the diseases of the eyes, and the most approved methods of treatment.

In the treatment of aneurismal diseases, the English, German, and American surgeons have much to be proud of. All the boldest operations in this branch of surgery, have been devised by the genius, and executed by the spirit and skill of modern surgeons, many of whom are still living, and are ornaments to their countries. The carotid, the arteria innominata, the subclavian, the external and internal iliac, the aorta and common iliac, and, in fact, all the principal arteries in the body have been the subject of surgical operations.

In the modern practice of surgery, a variety of old prejudices are gradually vanishing. Peruvian bark, not many years ago, was regarded as a sovereign remedy and specific for nearly

all cases of gangrene; and in these and many other instances, it was prescribed without any discrimination, and in doses beyond all moderation. But the false idea, that this medicine has any specific effect in checking mortification, no longer blinds the senses of the most superficial practitioner. He neither believes this doctrine, nor the still more absurd opinion, that strength can be mysteriously extracted from this vegetable substance, and communicated to the human constitution in proportion to the quantity which can be made to remain in the stomach.

The valuable discoveries recently made in France, relative to quinine and cinchonine, the essential parts of Peruvian bark, comprised in a very small compass, will lead to great amendment in the modes of prescribing this medicine in every case where it may deserve trial.

At the present day, the subject of mortification opens to us a point for investigation of the first-rate consequence. Every surgeon is aware that when a limb is deeply affected with mortification, amputation is commonly necessary. This is generally acknowledged; but the performance of the operation has since the time of Mr. Pott, only been sanctioned when the mortification has manifestly ceased to spread, and a line of separation is formed between the dead and living parts. All other instances, in which the disorder was in a spreading state, were left to their fate. It is true, some of the old surgeons occasionally ventured to deviate from this precept; but, as they did so, without any discrimination, or knowledge of the particular examples which ought to form an exception to the general rule, their ill success can not constitute a just argument against the plan of amputating earlier in a certain description of cases.

Now, if modern experience prove, that many lives may be saved by a timely performance of amputation, under circumstances in which it has until lately been generally condemned, it must be allowed that the established innovation will be one of the greatest improvements in the practice of the present time.

For reviving the consideration of this question, and venturing to deviate from the beaten path, the world is much indebted to that eminent military surgeon, Baron Larrey. How different his doctrines and practice are from those usually taught in the schools, will be best seen by a reference to his own works.

Connected with this topic is *Hospital Gangrene*, a case which deserves here to be pointed out, as having received considerable attention of late years, and being much better treated, now that the efficacy of the solution of arsenic, and strong nitrous acid, has been so completely proved, by the observations of Blackadder and Welbank.

In the treatment of ununited fractures, the simple and ingenious practice, suggested by Dr. Physick of Philadelphia,

merits particular notice; various successful trials have been made of it in England and France, as well as in this country, and, though liable to failure, it is yet entitled to be regarded as a valuable addition to the plans hitherto devised for these cases, which too often render the patient a helpless cripple during life.

The inestimable treatise of Dr. Jones on Hemorrhage has now produced quite a revolution in all the principles by which the surgeon is guided in the employment of the ligature for the stoppage of bleeding and the cure of aneurisms. Instead of thick clumsy cords, small firm silks, or threads, are now generally used; and so far is the practitioner from being fearful of tying arteries too tightly, lest the ligature cut through them, that it is now a particular object with him to apply the silk, or thread, with a certain degree of force, in order that the inner coat of the vessel may be divided. If this be not done, the effusion of coagulating lymph, within the artery, an important part of the process of obliteration, can not be expected as a matter of certainty, and secondary hemorrhage is more likely to occur. But in order to convey an adequate idea of the beneficial changes, which Dr. Jones' observations are tending to produce in practice, it is necessary that the reader should refer to his own work, where he will find a full account of the results of all his interesting experiments.

Besides using very small, firm, round threads, instead of large, flat tapes, or cords, as was the custom a few years ago, modern surgeons begin to suspect that much benefit may also arise from cutting off both portions of the ligature close to the knot, after amputation, the removal of the breast, &c. No one has insisted so much as Mr. Lawrence upon the propriety of examining further the merits of this innovation. If no bad effects result from leaving so small a particle of extraneous substance in the flesh, as the little bit of silk composing the knot and noose on the artery, the practice will form a considerable improvement. The wound may then be brought together at every point; the quantity of extraneous matter in the part will be lessened to almost nothing, the danger of convulsive affections will be reduced in proportion as a serious cause of pain and irritation is diminished; and the chance of accomplishing perfect union by the first intention will be materially increased. Mr. Lawrence has tried the plan in many instances, and hitherto his experience has not found any ill consequences follow, while it has proved that many advantages are undoubtedly the result of it. Mr. Cross, of Norwich, however, has detailed some observations, which are rather against the practice, and it is certainly far from being generally, or even commonly adopted. After amputation, it was practised by several military surgeons in the late war; and, although they probably did not employ exactly such ligatures as this mode absolutely requires, few of them met with any instances of future trouble from the minute bits of ligature enclosed in the wound,

with the exception of Mr. Guthrie, and one or two other army surgeons of my acquaintance. However, if large ligatures be used, the practice is not fairly tried, or rather the practice is not tried at all; because the great principle on which it answers, is the very small atom of silk, composing the extraneous substance, left in the wound, when such ligatures as Mr. Lawrence particularly recommends, are employed. Delpech and Roux have also sometimes adopted the plan of removing the ends of the ligature close to the knot.

Amongst other real improvements in modern practice, I must not forget the present more rational method of dressing the wound, after the majority of capital operations, with light, cooling applications, instead of laying on the part a farrago of irritating pledgets and plasters, and a cumbersome mass of lint, tow, flannel, and other bandages, woollen caps, &c. The fewer the adhesive strips are the better, if they only hold the lips of the wound together. This is all they are intended to do. Whereas, if you apply more than are necessary for this purpose, they do harm by heating the part and covering the wound so entirely as to prevent the issue of the discharge. Over the adhesive plasters, let the surgeon be content with placing simple pledgets of spermaceti cerate, and some linen wet with cold water, which will often avert hurtful degrees of pain and inflammation, by keeping the parts cool.

Wars, which are unfavourable to most other sciences, are rather conducive to advances in surgery. The many new and interesting observations, which Baron Larrey has made in the course of his long and extensive military experience, are a proof of the foregoing remark. Pitard, almost the founder of surgery in France, was a military surgeon. Ambrose Paré and Wiseman also collected their most valuable knowledge principally in the service of the army. Mr. Hunter himself gained much of his practical information in the same line of life. To Baron Larrey surgeons are indebted for many highly important observations, relating to amputation in cases of gun-shot wounds. In particular, he has adduced a larger and more convincing body of evidence, than was ever before collected, to prove, that, in gun-shot injuries, the operation of amputation should always be performed without the least delay, in every instance, in which such operation is judged to be unavoidable, and the ultimate preservation of the limb either impossible, or beyond the scope of all rational probability. He has established the truth of this most important precept in military surgery by innumerable facts, drawn chiefly from his own ample experience, and partly from the practice of many able colleagues. The great operations of the shoulder and hip-joint amputations, he has executed with success. The necessity for the former, however, he proves may sometimes be superseded, and the limb be saved, by making a suitable incision for the extraction of the splintered portions of the upper part of the humerus. This method, which was in many in-

stances done with success in the peninsular war, and has been also repeatedly performed with the same result by Baron Percy, was, I believe, originally proposed and practised by Boucher. However, it was first more particularly described, and even practised, by Mr. C. White of Manchester. Mr. Morrell also performed it successfully in the York Hospital.

Amputation at the hip-joint, performed only in the most dreadful cases, because itself the most dreadful operation in surgery, Baron Larrey has performed five times, and twice (I believe) with success. It has also now been done by Messrs. Brownrigg and Guthrie, Sir Astley Cooper, Graëfe, Walther, Delpech, and others, and most of these cases, though not all, terminated in the recovery of the patients. As must be the case, however, on account of the desperate circumstances under which the operation is performed, and the severity of the operation itself, the examples of recovery bear only a small proportion to the large number of deaths, known to have followed amputation at the hip in the many cases in which it has now been undertaken. However, the unfortunate truth should not be exaggerated into a reason for an unqualified condemnation of the practice, which is adopted as the only means affording a chance of saving life. But as there may be difficulty in deciding whether the patient will have the best chance with, or without the operation, it is to be hoped that no surgeons will perform it except under the authority of the united opinion of a board, or consultation of the best informed practitioners, whom circumstances will allow to assemble. It is to be hoped, likewise, that there is no man in the profession, so destitute of honour and principle, as to aim at notoriety through the medium of this terrible operation, and court the opportunity of doing it merely with this view, instead of being compelled to undertake it by the really desperate circumstances of the case. If there be such an individual in existence, his scheme of wading through blood to reputation, now that the novelty of the operation has vanished, would have but little chance of success. Be it also recollected by the profession, that while the operation itself requires only ordinary talents, the business of avoiding it, and of discriminating the exact cases, in which it should be done, implies an extensive acquaintance with the principles of surgery, ample experience, and more than common abilities and judgment.

In military surgery, the useful innovation of *ambulances*, or light caravans, furnished with a proper number of surgeons, assistants and orderlies, and capable of keeping up with the vanguard, if requisite, is undoubtedly the best means of affording speedy surgical assistance to the wounded on the field of battle, and ought to be enumerated as one of the greatest modern improvements. Barons Percy and Larrey, deserve the chief praise for their successful exertions in organizing and bringing to perfection so indispensable an establishment.

Another improvement in surgery, of an humbler, but not

less useful description, than some things to which I have already adverted, is the elastic gum seton, which, for cleanliness and convenience, is far superior to what has generally been employed by practitioners. The invention, I believe, is one of the results of French ingenuity.

The excision of more or less considerable portions of the lower-jaw, in cases of irremediable disease of it, is a new proceeding, exemplifying the still continued progress of the boldest parts of operative surgery. The practice also merits notice on another account: it is an extension of the most effectual part of surgery to a class of miserable and hopeless cases, first devised and executed by Dr. Deadrick, of Tennessee.





OPERATIVE SURGERY.



CHAPTER I.

OF OPERATIONS IN GENERAL.

SECTION I.

Of the Rules concerning the proper time for performing Operations.

No surgical operation, however simple it may be, should ever be undertaken before it is absolutely indicated by one or more of the following circumstances:

I.—When there is reason to suppose that the operation will be the only chance of re-establishing the order and harmony of the injured parts, so as to preserve the life of the patient, or restore him to the enjoyment of health.

II.—When the disease has obstinately resisted all such means as have been employed for its cure.

III.—When the surgeon is positively convinced, from the nature of the case, that neither the length of the operation, nor the pain and loss of blood which accompany it, nor the subsequent inflammation and suppuration will terminate the life of the patient more speedily than if no operation were performed. —Under these circumstances, which are always of a very serious nature, and frequently embarrassing, and where the dangers of the operation may equal those which result from the disease, the surgeon should only have in view, in the part which he is to execute, the safety of his patient, and pay no regard to the advantages which may accrue to him from the success of a desperate case. If he is of opinion that the operation should be performed, he should by no means neglect it, and, even at the interest of his own reputation, take a share in the uncertainty of the success and in the dangers of the friends of the patient.

IV.—No operation should be undertaken until the surgeon is convinced that it may be completed in a short time; and

until he has carefully reflected upon the dispositions of the parts, the different accidents which may interrupt the operation, and the means which are required to remedy them. In a word, until every thing is prepared, and the surgeon has carefully reflected upon the consequences of the operation.

V.—No operation should ever be attempted unless there is reason to suppose that it will effect a complete and permanent cure. The hope of a temporary relief of the state of the patient should by no means induce us to operate, although the operation may be of such a nature as not to be accompanied by any severe pain, or followed by any danger.

When the necessity of an operation and the possibility of performing it have been carefully ascertained, the next measure to be resorted to, is to determine upon the time when it is to be executed.

Every operation which is intended to remedy an injury which actually endangers the life of the patient, or which may be a source of more severe diseases, should be performed without the least possible delay. As examples of such cases, we may refer to the application of the ligature to wounded arteries, and to the extraction of foreign bodies from the œsophagus and other organs.

In some instances, however, it may be necessary to delay the performance of an operation on account of the age of the patient, the climate, and season of the year, or on account of the prevailing diseases, and other peculiar circumstances.

There are some operations, also, which should never be performed during infancy, on account of the difficulties with which they must necessarily be attended. Of this description are the operations for hare-lip, artificial pupil, cataract, and others of a similar nature. There are others, however, which present great chances of success, when the patient is under the influence of a particular climate, or season of the year. Thus, in cases of amputations in which the patients have been previously exhausted in consequence of protracted and painful diseases, the parts cicatrize more speedily, and are less frequently complicated with tetanus and other severe symptoms, in mild and temperate countries, than in cold and humid regions. It is seldom in our power, however, to procure these advantages, and when we are deprived of them, we should always endeavour to supply them by choosing a proper season in the country in which we reside. As a general rule, we should always avoid performing operations in very cold and wet seasons, as well as in very hot and dry weather. Hot and dry weather, however, should be preferred in those countries, where the seasons are extremely subject to frequent and sudden vicissitudes. In temperate countries, autumn and spring are the seasons in which the grand operations in surgery are followed with more speedy and certain success, especially spring, than in any other part of the year, on account of the mildness and equality of the temperature, and because it is followed by

another season, which, though not so favourable as spring itself, is preferable to that which succeeds autumn. This is a highly important circumstance in cases of protracted convalescence.

The grand operations frequently render those upon whom they are performed susceptible to disease, and especially to inflammations of the principal viscera. This being the case, it is of the utmost importance not to operate when these diseases are prevalent, and to be particularly careful not to confine the patient where there prevails an epidemic hospital gangrene. We should likewise make it a general rule, to put the patient, both before and after the operation, upon a course of treatment for the removal of the general affection which has produced or accompanies the local affection.

SECTION II.

Of the General Rules to be observed before commencing an Operation.

When an operation is deemed necessary, we should always endeavour to dispose the patient so as to enable him to bear it, and prepare every thing which may be required for its performance.

It is extremely difficult, and, in fact, almost impossible on the present occasion, to give a satisfactory account of the different moral preparations which a patient should undergo before he submits to an operation, because they vary ad infinitum, like the character of man, and the various conditions of human life. It will suffice, therefore, to be aware of the cases, in which we should have recourse to them, and as to the manner of proceeding, it must always be left to the judgment of the surgeon. As the disposition of the patient's mind will frequently have a great influence upon the result of the operation, it is extremely important to make it as comfortable as possible. If we can inspire our patient with confidence and courage, resignation and patience, which are so essential in these cases, he will soon be willing to submit to the operation which may be necessary for his relief.

No operation should ever be performed without apprizing the patient; but as a general rule, it is extremely improper to appoint the day and hour before hand, because, by this means, we frequently expose the patient to the most cruel anguish. This important rule should never be lost sight of, even in those persons who ardently desire to be operated upon, and who have a sufficient share of confidence and courage. When the patient is pusillanimous, or endowed with an exalted degree of sensibility, and merely reflects upon the dangers and unfavourable chances of the operation, so as to lead us to suppose that it will make a very deep impression upon the system,

it will be almost always preferable to leave him ignorant of our resolution; though we should endeavour to persuade him, by every means in our power, to prepare himself for the operation, in such a way that we may perform it as soon as he shall have received a favourable impression, and has got the better of his fears.

All these preparations, however, which may be justly called moral, are not the only ones to which a patient should be subjected before he submits to an operation. There are others, in fact, which are equally variable, and which are intended to modify the physical state of the organs, so as to prevent the dangerous effects which might result from a derangement of the system in consequence of the operation.

These physical preparations must necessarily vary according to the predispositions of the patient: before an operation is commenced, therefore, it is indispensably necessary that the surgeon should make himself acquainted with the temperament and idiosyncrasy of his patient, and ascertain what kind of disease he is to apprehend, and what prophylactic means are indicated. There is only one circumstance which can possibly authorize us to neglect this precaution, and that is, the necessity of operating immediately. The indications which are most commonly presented and the proper means for fulfilling them, are the following:

In an individual who is endowed with a good constitution, and whose functions are in such a state of equilibrium as not to appear to have any marked predisposition to any particular disease, dieting and diluent drinks, for a few days before the operation, and one or two baths, are the only means which are required. If the patient, however, is very irritable, and subject to nervous symptoms, it will be necessary to have recourse to anti-spasmodic preparations; if, on the contrary, he is plethoric, it will be proper to have recourse to one or two bleedings, according to the age and strength of the patient, unless the operation is of such a nature as to be likely to occasion a considerable loss of blood; in which circumstance the bleeding should be deferred until after the operation. If the patient has been in a state of debility prior to the disease, or if it has been produced, or kept up by the disease, or by some accidental cause, we should endeavour to raise his strength by the use of an analeptic regimen and tonic medicines; but if these means have been for a long time employed without advantage, and the patient's system has become habituated to them, so as to have but a feeble influence, we should give him temporary strength, in order to enable him to bear the operation, by the use of stimulants, such as wine, and the aromatic tinctures. Finally, the state of the *primæ viæ* should be carefully examined, because it is the most common source of the evil which endangers the success of the operation. If there is the slightest gastro-intestinal irritation, it should be carefully removed by a strict diet, the application of leeches to the

epigastrium or the abdomen, and by the use of diluent drinks: any foulness of the stomach, though it may produce no symptoms of irritation, should be combated by the use of emetics or purgatives. The presence of worms in the intestines, which is frequently a troublesome complication after some operations, requires the administration of anthelmintic remedies.

To these preparations, which are employed for the purpose of modifying the general system, should be added others which are of a purely local nature, and which are intended to place the parts, which are to be operated upon, in the most favourable condition for the performance and success of the operation. Thus, the parts should be cleansed by repeated ablutions, and, if they are covered with hair, they should be carefully shaved. Most of these preparations, which can not be possibly detailed on the present occasion, are subject to particular rules, which will be stated when speaking of the different operations in which they are required.

When all the preliminary precautions, to which we have alluded in the foregoing paragraphs, have been observed, and the surgeon has determined upon the mode of operating, he should carefully point out to his assistants the parts which they are to perform, and tell them in detail the plan of the operation, in order that they may properly aid him. It is necessary that all the assistants whom he employs should be accustomed to him, in order that they may be able to comprehend all his movements and foresee his intentions; they should be intelligent and attentive, and endowed with firmness, sangfroid, and a considerable degree of strength. It is especially necessary that those who present the instruments, compress or tie vessels or diseased parts, should be practical surgeons. Before he proceeds to the operation, the surgeon should likewise examine the instruments and bandages to satisfy himself that nothing is wanting.

The instruments and dressings must necessarily vary according to the operation. The first should be carefully arranged upon a small table in the order in which they are to be employed, and before they are used they should be carefully examined in order to ascertain that they are in a proper condition. It is necessary that there should be duplicates of those which are liable to break or become dull during the operation; and this precaution is especially applicable to forceps and tenacula, because it is sometimes necessary to employ several of them at the same time. It is extremely important, also, to place some other instruments upon another table, which may become necessary in consequence of certain dispositions of the parts, or from some unforeseen accident: these should consist of several tenacula of different forms and degrees of solidity, of caustics, ligature-forceps, ligatures, &c. In all cases, however, care should be taken not to let the patient see these preparations.

The different pieces which constitute the dressing-apparatus,

should likewise be placed upon a particular table, in the order in which they are to be used. They should consist of twice the number of what are required for the first dressing, in order that, if there supervene any accident, such as a consecutive hemorrhage, for example, it may be speedily arrested. These pieces, which must necessarily vary according to the circumstances of the case, should generally consist of waxed ligatures, strips of adhesive plaster, small linen bandages, spread with cerate, pledgets of fine lint, long or square compresses, either simple, double or graduated, pieces of fenestrated linen, single or double headed rollers, pins, &c. In addition to these, there should be at hand sponges, warm and cold water, salts or spiritous liquors, and proper candles, provided the light is intercepted by the operator or his assistants, or if it be already dark.

SECTION III.

Of the General Rules to be observed during the performance of an Operation.

The rules which are to be observed during an operation relate merely to the position of the patient, the situation of the operator and the assistants, to the proper means for arresting the hemorrhage, and to the means which are calculated either to diminish the pain resulting from the operation, or to remedy the accidents which may happen during its performance.

Position of the patient.—This position of the patient varies according to the situation of the disease, the state of his strength, and sometimes, according to the habit of the operator.—When the patient is to be seated upon a chair, it should be firm and of a proper height, and placed in a clear apartment, large enough to enable the operator and assistants to move about without impediment. The attitude of the patient must vary according to the seat of the affection: thus, when the operation is to be performed upon the face or breast, the patient should rest his back against a pillow, and his thighs and legs should be slightly flexed and held by an assistant, who should keep the knees in contact. When this has been done, the surgeon gives the head its proper direction, and requests another assistant to hold it by supporting it against his breast, and applying one of his hands upon the forehead. The arms should be left in a pendent position, and kept to the trunk by means of the cloth which is spread over the patient to protect him from the blood or other fluids that may be spilt during the operation. When the disease is situated on one of the sides of the chest, or on one of the superior extremities, the position should be precisely the same, with the exception, that the patient should be seated upon the side of the chair: in some cases,

it may become necessary for the assistant who steadies the head and stands on the sound side, to pass one of his arms before, and the other behind the chest, and to interlock his fingers under the axilla of the affected side, in order to fix the trunk as firmly as possible. When the affection is seated on the back, the patient should sit in such a manner that the diseased part shall be free and directed towards the operator, that is, he should pass the chair between his legs by turning his breast towards its back, which he must firmly embrace, as well as the pillow.

If the case be of such a nature as to require that the patient should lie upon his back, or in case the ordinary bed is sufficient for the purpose, as it sometimes happens when the operation is slight, it will scarcely be necessary to make any preparations, nor should the patient be permitted to rise. It sometimes happens, in fact, that the common bed is altogether preferable, especially when we have reason to apprehend that the slightest degree of motion will augment the disorder, or give rise to severe pain, or when the patient is so much exhausted as to be in danger of syncope. In case, however, the common bed does not answer the purpose, we should make one expressly for the operation. A bed of this description should be firm and solid, and sufficiently large to enable the patient to lie at ease; it should be low and easy of access, and should neither have posts nor head-board. If no such bed, however, can possibly be procured, a firm heavy table, covered with a mattress, a few sheets and pillows, will answer every purpose. The position of the patient must differ according to the part which is to be operated upon, and will be described in speaking of each operation in particular.

It was formerly a practice amongst surgeons to tie their patients; but at the present day we may very readily dispense with most of the coercive means that were formerly regarded as indispensably necessary. Proper assistants are sufficient in all cases, and their office most frequently consists, in preventing, by a slight degree of opposition, some inconsiderate movements. They should gently resist the attempts of the patient, and avoid fatiguing him by violent and useless efforts.

Position of the operator.—The position of the operator is still more variable than that of the patient. It differs, in fact, not only in the different operations, but even in the different steps of the same operation. As a general rule, however, the operator ought to stand, when the patient is placed in the middle of the bed; to sit, when the patient is seated upon a chair; and to kneel, when he is placed upon the edge of a very low bed or upon a very high seat.

Position of the assistants.—The position of the assistants must also necessarily vary, though it should always be such as to enable them to perform the duties which have been assigned to them during the operation. Thus, when the patient

is seated upon a chair, the assistants who hold the light, secure the patient, and arrest the blood, should be placed behind. The assistant who hands the instruments and the dressings, should be to the right of the operator, while the one who wipes the wound and applies the ligatures, should stand on the opposite side. In case the patient is placed in the recumbent posture, the principal assistant should be in front of the operator, having on his sides the assistants who hold the candles; on the left of the operator, should be the assistant who is to compress the the vessels; on the right the one who is to present the instruments; and at the head and foot of the bed, those who secure the patient. All these assistants should either stand, kneel, or sit, according to the circumstances of the case.

Proper means for arresting hemorrhage.—The proper means for arresting the effusion of blood, are compression and the application of the ligature, to which the operator should always speedily resort in order to preserve the strength of the patient, taking care, however, at the same time to distinguish the parts upon which each of them is to be applied.

Compression may be advantageously employed when the arteries are superficial, and are situated in the neighbourhood of such parts as may be used as fulcra. When the arteries, although they may be situated superficially, rest upon soft and flexible parts, the compression should act in such a way, that the vessel shall be placed between two powers, one of which shall serve as a fulcrum to the other, as happens when we compress the arteries of the pavilion of the ear, those of the cheeks and lips, the tongue, the labia pudendi and other parts. When the arteries are very moveable or deep-seated, like the primitive carotid, the lumbar, and the epigastric, compression can have no beneficial effects, and should therefore by no means be used.

As regards the point of the course of the artery upon which the compression should be applied, it is impossible to lay down any precise rules, because the condition, or the nature and situation of the patient, may cause the position of the vessels, which are to be compressed, to vary ad infinitum.

The compression of an artery, before an operation, may be effected by means of the fingers or mechanical instruments. The former method, although not more certain in its results, should generally be preferred, because, if the assistant who performs it is intelligent, skilful and perfectly deliberate, it will be attended with important advantages. By this means, the integuments will not be contused, and the fingers, with which the artery is compressed, will be enabled to follow the vessel in all the displacements to which it may be exposed. The operator, also, will be enabled by the jet of blood to ascertain the exact position of the vessels which are to be tied; or, if he is anxious after the orifice of the vessel has been exposed, immediately to arrest the hemorrhage, it may be easily effected by re-

applying the fingers. In adopting this method, the surgeon should carefully ascertain the exact situation of the vessel, its direction, and the degree of inclination from the surface upon which it is placed, in order to be able to compress it in a perpendicular direction. If it be necessary to use the thumb, it should be placed across the artery; but if it be more convenient to employ the fingers, they should be placed over the course of the vessel, while the thumb, resting upon the opposite or neighbouring part, serves as a fulcrum to the hand. If it be necessary to continue the pressure for some time, the assistant should prevent his fingers from becoming numb or fatigued by using those of the other hand; but this is seldom necessary if the pressure be applied in a proper manner, that is, if the vessel be pressed gently, and in a direction exactly perpendicular to the surface of the part which serves as the fulcrum. It is extremely important that the assistant who makes the compression, should carefully watch its effects during the operation, and speedily remedy any irregularities that may occur. To accomplish this, he should steadily fix his eyes upon the part that is operated upon, and should by no means be interrupted. In some instances, however, it is impossible to procure a person who is properly qualified to make the necessary compression with the fingers; and under these circumstances, we must have recourse either to the *garrot* or the tourniquet of J. L. Petit.

The *garrot* has the advantage that it may always be readily procured, and that it completely arrests the blood by suspending its course, not only in the principal artery, but also in the collateral passages, by the pressure which it exerts upon every part of the limb. It has also the advantage of creating a kind of numbness which renders the pain more supportable, especially in very delicate individuals. Notwithstanding this, however, its inconveniences are so great that surgeons frequently prefer the tourniquet, which exerts an equally great degree of pressure, without producing any contusion of the soft parts, and without completely arresting the venous circulation or preventing the retraction of the muscles; for it is well known, that in circular amputations of the extremities, the want of the retraction of the muscles is a frequent cause of the conical form of the stump, the projection of the bone, and the difficulties of the cicatrization. The *garrot*, therefore, should only be used in operating upon very irritable individuals, or upon those in whom the slightest loss of blood would prove injurious, and when it can be applied upon the limb, so as not to destroy the contractions of the muscles, and when it is not necessary to keep it on too long, or if the nature of the part be such that the tourniquet can not be used.

In applying this instrument, the surgeon should place upon the course of the artery a cylindrical pad, fixed to the middle of a long, thick, and narrow compress, the ends of which are to be carried around the limb and crossed. Upon this compress

is to be applied a very strong handkerchief, which should be carried twice around the limb, and tied at the place where the ends of the compress are crossed. This being done, the surgeon places a piece of horn between the compress and the noose; and after having passed under the knot a stick of wood, he takes hold of its extremities, and turns them, so as to twist the handkerchief, and press the pad firmly upon the vessel.

Tourniquet.—In using the tourniquet, the pad which is attached to the screw of the instrument, should be placed exactly over the course of the artery. The tourniquet should then be held with one hand, while the band is passed around the limb with the other. The surgeon next buckles the extremities of the band, after having previously applied the largest pad upon the point directly opposite to the pad which is attached to the screw. The band is then to be drawn sufficiently tight to retain the apparatus, and the two pads are to be approximated by turning the screw. In this manner, the artery is to be gradually compressed until the circulation is arrested, which may be ascertained by examining its trunk or some of its branches below the point of compression.

As soon as the tourniquet or garrot is properly applied, an assistant should carefully watch and direct its action. To accomplish this, he should hold the instrument so as to prevent its displacement, as well as to diminish or augment the pressure, according to the wishes of the operator. When the operation is completed, and the compression is no longer necessary, instead of removing the instrument suddenly, it should be gradually relaxed, and should not be taken off until the surgeon has carefully ascertained that all the vessels are secured.

No surgical operation should ever be undertaken in which large vascular trunks are concerned, unless the operator is certain that he can suspend the circulation; except those where the vessels are not divided until the operation is nearly finished; for, under these circumstances, intelligent assistants may readily compress them before the knife, and thus prevent the effusion of blood. But, as a general rule, it is unnecessary to arrest the course of the blood previously to commencing the operation, in those cases when there is no danger of opening a large vessel.

Means for diminishing the pain resulting from an operation.—The means for diminishing the pain resulting from an operation, are really of considerable importance, and consist simply in the employment of sharp instruments, in the lightness and rapidity with which they are carried through the parts, and in the shortness of time that is devoted to the operation. To accomplish this desirable object, the operator should never use any but the best and sharpest instruments, and in carrying the knife through the parts he should divide them at a single stroke. He should take care also to warm the blade of the instrument in a little warm oil or water.

Accidents during an operation.—The means for remedying the accidents which may occur during an operation must necessarily vary according to the nature of the case; but, amongst all the unpleasant occurrences which can possibly happen, hemorrhage claims our most serious attention, both on account of its frequency and the danger to which it often gives rise.

If there be a violent jet of blood immediately upon dividing a large vessel, and the hemorrhage does not almost instantly cease, the surgeon may be sure that the compression is unequal, and that the assistant to whom it was confided, has either abandoned it, or has displaced the garrot or tourniquet. As soon as this is perceived, the surgeon should suspend the operation, and immediately place the fingers of one hand upon the course of the divided vessel, and compress it in such a manner as completely to arrest the hemorrhage. Then, after having confided this office to a bolder or more intelligent assistant, or after having replaced the instrument, he should proceed to finish the operation.

In case the blood does not come from the principal trunk, but merely from some of the branches in which it is impossible to suspend the circulation by compression, the hemorrhage may be prevented either by tying the vessels as they are divided, or by adopting the method of J. L. Petit, which consists in directing some intelligent assistant to arrest the effusion of blood by applying the fingers to the orifice of the vessels, which should be tied as soon as the operation is completed. The former method, however, is by far the best, and should, therefore, be generally adopted.

When we are obliged to operate upon parts that are plentifully supplied with veins, it frequently happens that there is a flow of blood at the moment of the division of the parts, in consequence of the number of vessels and the stagnation of the venous blood from the application of the tourniquet. Under these circumstances, before any means be employed to arrest the hemorrhage, we should carefully ascertain the nature of the fluid; for if it be venous, it will speedily cease. If the blood, however, although it may be furnished by the veins, should continue to flow, it will become absolutely necessary to arrest it, either on account of its interrupting the operator, or because it may produce too great a degree of consecutive debility. In these cases, the most simple and efficacious means for checking the hemorrhage, is to request the patient to take long and deep inspirations, and to let the air rush into his lungs with considerable effort. In this manner, the pulmonary circulation, and consequently the venous circulation of the part, will become retarded, and the hemorrhage, which is merely owing to an engorgement of the general venous system, will speedily cease.

SECTION IV.

Of the General Rules to be observed after the Performance of an Operation.

As soon as an operation is completed, we should carefully arrest or prevent the discharge of blood from the orifices of the divided vessels, apply the dressings, and enable the patient to regain his health.

Means for arresting the hemorrhage.—When the operation is completed, and the surgeon has carefully ascertained that all the important arteries are secured, he should remove the coagula of blood from the surface of the wound, by means of a sponge and warm water, and have it gently elevated. If no hemorrhage appears, he may be sure that no important vessel has been omitted, and proceed without fear to the application of the dressings.

The ligature should be preferred to every other means when the disposition of the parts and the situation of the vessels are such as to permit its application; and it is only in cases of an opposite character that compression and the application of caustics can be of any use.

The compression is direct, when it acts immediately upon the orifice of the divided vessel; and lateral, when it exerts its effects upon the course of the artery, at some distance from the wound.

Direct compression.—The direct compression should be employed when the vessels are small, and when it is impossible to make use of the ligature or cauterization. In some instances, however, it is indispensably necessary, especially in cases of injury of the arteries of the abdominal parietes or of the perineum, resulting from paracentesis or the operation of lithotomy, and in cases of hemorrhage of the nasal cavities, the maxillary sinus, or the vagina. It is made by applying several small dossils of lint upon the open orifice of the artery, and covering them with a sufficient number of compresses, which are to be disposed in such a manner, that in tying the bandage with which they are secured, they shall produce a sufficiently strong and uniform pressure upon the artery to prevent the hemorrhage. This species of compression may be made in different ways, which can only be pointed out in speaking of the cases in which they are applicable.

Lateral compression.—The lateral compression can only be of service when it is applied upon the vessels which rest firmly upon the surrounding parts, as the temporal, occipital and intercostal arteries. On the head, it is made nearly in the same manner as the direct compression, but instead of the dossils of lint, we should make use of graduated compresses, arranged so as to form a pyramid, the apex of which should rest upon the course of the artery, and be secured by a proper bandage. In the ex-

tremities, the compression is made with the tourniquet, or some other instrument; but in these places it presents but little chance of safety, and can never, when employed alone, protect the patient from the danger which it is intended to obviate.

Cauterization.—Cauterization, although painful and terrifying to the patient, and incapable of arresting the bleeding from large arteries, is much more certain in its effects than the direct compression, and should always be resorted to in those cases where it is impossible to employ the ligature or the lateral compression. It is applicable therefore to those operations which are performed upon organs that are abundantly supplied with capillary vessels, as the tongue, the lips, and the penis; and in cases of hemorrhage from the ranine arteries, the roots of fungous excrescences of the maxillary sinus, and from the surfaces of wounds resulting from the extirpation of large tumours. The operation consists in applying the cautery at a white heat upon the orifice of the vessel, immediately upon withdrawing the dossils of lint which were previously used to arrest the hemorrhage and to dry the wound.

Application of the ligature.—The manner of applying ligatures to divided vessels during an operation is of two kinds: immediate, when it includes the artery alone; and mediate, when it embraces both the artery and a portion of the surrounding tissues.

The instruments which are required for the application of a ligature are, a pair of dissecting-forceps, the size of which should be proportioned to the volume of the vessels which are to be tied, and several needles, furnished each with a ligature, in case we wish to reach a deep seated artery and apply the mediate ligature. The ligatures should be composed of one or more threads of silk or hemp, doubled and united together with wax, so as to form a kind of riband, the size of which should correspond to the volume of the vessel.

In the operation for tying a vessel, we must endeavour, successively, to search for the artery, to seize it and apply the ligature.

When the wound has been properly cleaned, the surgeon should carefully ascertain the situation of the vessels; and if he be unable to perceive them, he should request the assistant who compresses them, to relax the tourniquet, in order to get a jet of blood. By this means, the artery will be easily exposed, and the surgeon will have an opportunity of seizing it, either by introducing one of the blades of the forceps into its caliber, or, what is still better, he will be enabled to bring it between the jaws of the instrument, and pull it out so as to make it sufficiently prominent. When this has been done, the assistant who stands on the left of the operator, holds the ligature between the thumb and index finger of the left hand, carries it carefully around the vessel, and ties it into a double knot. In performing this duty, the assistant should be extremely careful not to touch the forceps or the hand of the operator.

The ligature should be drawn so tight as not to slip from the vessel.

When the vessel which is to be tied, is situated at the bottom of a deep and narrow cavity, and is so firmly embedded as not to admit of being drawn out, or is surrounded by a fibrous membrane, the surgeon will be obliged to have recourse to the mediate ligature. This is applied by carrying the point of a needle, the convexity of which is covered by the index finger, around the parietes of the vessel, at a short distance from its orifice. By depressing the point of the instrument, it will be made to describe a semicircle, in consequence of which it will come out at the place opposite to the circumference of the artery, but always at the same distance from its parietes. After the needle has been withdrawn, it should be again introduced in order to form another semicircle on the opposite side of the vessel, and made to pass out at the point where it was first introduced. In this manner, the artery will be completely surrounded by the ligature. Its extremities should then be brought into contact, and the artery and the tissues by which it is embraced, should be drawn out by means of a pair of forceps. During this time, the assistant should make a double knot, in the same manner as in the application of the immediate ligature.

In tying vessels after an operation, it is a general rule to take up all those which furnish the least jet of blood, and to expose every one by means of a sponge, which bled during the early part of the operation, but which has entirely ceased by the time it is finished. This is a very important circumstance, from the fact that the vessels from which the blood oozes but very feebly, may, in becoming dilated, when the circulation is re-established, become the source of very severe hemorrhage. Nor should we omit, in operating upon parts where the vessels have numerous ramifications, as the face, the neck, and the hands, and in cases of aneurism, strangulated inguinal or crural herniæ, and others of a similar nature, to tie either the mouth of the vessel which corresponds to the heart, or that which is opposite to it. Finally, care should always be taken to avoid including in the ligature too large a portion of the parts which surround the vessel, nor should it be entirely insulated from the adjacent cellular tissue. The most proper method, therefore, consists in including in the noose of the ligature only the cellular tissue which surrounds the artery, and in tying the first knot only moderately tight. When the ligature embraces muscular fibres or adipose cellular tissue, it soon becomes relaxed, on account of the facility with which it divides them. But when it includes a nerve, it will give rise to very severe pain, which is sometimes protracted for a long time, and may be attended with very unpleasant consequences. In case the ligature includes some of the fibrous tissue, it will generally remain around the vessel for several months before it becomes detached.

If, after we have suppressed the blood, either by the applica-

tion of the ligature, or some other means, we have reason to apprehend hemorrhage, it should be carefully prevented by retarding the impulse of the blood in the divided vessels. To accomplish this, pressure should be applied upon the principal artery of the part, which should be, at the same time, elevated so as to oblige the blood, in order to arrive there, to ascend against its own weight; and if the state of the patient demand it, we should have recourse even to general bleeding. In all these cases we should make use of a debilitating regimen, diluent drinks, cold applications to the parts, and, if the circumstances of the case require it, even resort to revulsives.

If, notwithstanding these precautions, there arises a consecutive hemorrhage, we should immediately endeavour to ascertain its cause, in order that we may be able to remedy it as speedily and effectually as possible. It should by no means be forgotten that this cause may be inherent in the patient, the affected part, the dressings, or some external influence: the hemorrhage may also be owing, 1st, to a defect in the ligature at one of the ends of the artery, after the circulation has been re-established in the mouth of the vessel oppositely to the heart, in consequence of the numerous anastomoses of the parts; 2dly, to the impossibility of tying all the vessels, either on account of the nervous symptoms of the patient, which interrupt the circulation and produce a momentary suspension of the course of the blood, or some other accident; 3dly, to a very powerful moral influence, or to a very violent shock, like that resulting from the discharge of a cannon; 4thly, to the abuse of spiritous liquor; 5thly, to the irritation which may arise from heavy and awkward dressings; and 6thly, to a particular predisposition of the subject to hemorrhage.

When the operation has been performed in the most careful manner, and the case is of such a nature as to induce us to apprehend hemorrhage, the surgeon, into whose care the patient is entrusted, should by no means neglect to examine the dressings from time to time. If he finds that they are impregnated with a reddish fluid, forming a spot which is terminated by a whitish or reddish circle, he should regard this phenomenon merely as the result of the bloody oozing which follows the operation, and the dressings should by no means be disturbed; but if he finds the exterior pieces of a deep red, and if by touching this spot, which is every where equally red, his fingers become moistened with blood, he may be certain of the existence of a hemorrhage, and should immediately proceed to remove the dressings and wipe away the coagula of blood which cover the wound with a sponge and warm water, in order to ascertain precisely the nature and situation of the hemorrhage. If the blood escapes so as to form a sensible jet, it should be immediately arrested by tying the vessels from which it proceeds. If, however, it merely passes drop by drop, the surgeon should ascertain by a careful examination of the wound, whether it is exhaled by the capillary vessels, or

whether it is furnished by a small artery embedded amongst the muscles: this last circumstance may be easily perceived, if the cellular tissue which covers the orifice of the vessel forms a small tumour, in consequence of the infiltration of the blood. When this is found to be the case, the vessel should by all means be exposed and tied.

When the hemorrhage appears a few days after the operation, that is, at the time when the tissues are inflamed and brittle, we should not, although the ligature may appear to be indispensably necessary on account of the size of the open vessel, by any means attempt to tie the extremity of the artery; but, on the contrary, the vessel should be tied at some distance from the wound.

When the vessel which gives rise to the hemorrhage, is small and deeply seated, we should have recourse to the application of the actual cautery, unless the nature of the case is such as to enable us to make use of the direct compression. In case, however, the blood exhales from a great number of small arterial orifices, and the hemorrhage is not owing to a plethoric state of the patient, or to a very strong local fluxion, the actual cautery will be the only means from which we can expect to derive any permanent advantage. When the patient is plethoric, and the parts are in an irritable condition, we should by all means resort to the abstraction of blood, and to the use of emollient and soothing applications. In case also there is a determination of blood to the parts, and if, on removing the dressings, the hemorrhage has ceased spontaneously, the wound should be left perfectly free or merely covered with a compress until the tendency to hemorrhage has completely subsided.

A considerable degree of hemorrhage is always a serious accident, not only because it debilitates the patient, and alarms and discourages him, but also because it can not always be completely checked, or prevented from returning. Before an operation is commenced, therefore, we should always endeavour to prevent hemorrhage, and to have every thing at hand in order that it may be arrested as soon as it makes its appearance. It is, consequently, indispensably necessary that the patient should be carefully watched after the operation is completed, by a surgeon who is provided with ligatures, lint, agarie, absorbent powders, cauteries, and every thing, in fact, that may be required in case there should be hemorrhage.

As soon as an operation is completely finished, that is, after proper measures have been taken for arresting or preventing hemorrhage, we should proceed to the dressing, which consists in applying to the affected parts such means as are calculated to insure their cure, to protect them from the contact of foreign bodies and the disagreeable influence of deleterious emanations, and to put them in such a condition as to prevent the parts which are in the neighbourhood of the wound from becoming soiled by the discharge of matter.

In applying the dressings, the surgeon is obliged to make use of instruments, linen or other materials, and medicated substances. These different materials vary, as well as their mode of employment, according to the kind of dressing, so that it will be impossible to enter upon any details on the present occasion: let it suffice, therefore, to give a simple enumeration.

The most necessary materials are a spatula, a pair of dressing-forceps, a pair of tweezers, lint, compresses and bandages, a few basins, sponges, and towels.

In applying the dressings, it may be observed, as a general rule, that the surgeon should be placed on the side of the part upon which he is obliged to fix them, and in such a position that he may experience no fatigue or inconvenience. The patient and the affected part should be put in the most favourable situation for the prompt and easy application of the dressings; and after the wound has been carefully cleansed by means of lotions or detergents, the surgeon should gently apply the lint, compresses, and bandages, and should carefully prevent them from compressing the parts, unless this be indicated. Every part of the dressings should be applied with skill, promptitude and mildness, so as to inflict no pain upon the patient. The wound should be as little exposed as possible; and in order to accomplish this, the new dressings should be applied as soon as the others have been removed. Finally, when the application of the dressings is completed, the part should be put in the most favourable position for relaxing the muscles and preventing pain and fatigue.

Hygiene of the patient.—If a healthy individual be obliged to make a rational choice, and to employ, to a moderate extent, the numerous agents by which he is surrounded, and the influence of which is so necessary to the preservation of his health and existence, of how much more importance is it when the harmony of the functions of the animal economy has been interrupted. An operation, however slight, always produces some degree of change in the system, from which arises a peculiar susceptibility to disease; and as the success of an operation depends upon the state of integrity of the principal organs, it is indispensably necessary, in order to maintain them in the most favourable state, to place the patient in the best hygienic condition, that is, to remove him from every unfavourable influence, and to surround him with such as are calculated to promote the exercise of all his functions. The hygienic requirements relate chiefly to the choice of a place of residence, to the modifications of the air of the apartment, to the composition of the bed, the food and drink of the patient, his mode of exercise, and the proper means for preventing the different moral commotions.*

* For a more full account of these different subjects, the reader is referred to the excellent Manuel D'Hygiene de M. Deslandes.

The patient should be confined in a large room, which should be well ventilated, and free from noise. The air should be enabled to circulate freely, without experiencing any sudden variations of temperature, which should be from ten to twelve degrees of Raumeur's thermometer, if the operation be of such a nature as to have a tendency to give rise to hemorrhage; from fourteen to sixteen, when there are symptoms of irritation; and from sixteen to eighteen, during the latter stages of the disease, when there is no longer any danger of inflammation. Beside this, the air should be perfectly pure and soft, and contain no disagreeable effluvia.

If the air around the patient be surcharged with unwholesome effluvia, which, by exciting a morbid action in the system, arrest the process of cicatrization, and give rise to fungous granulations, and the discharge of a grayish, fetid and ichorous matter, or to those putrid miasmata which arise from severe general or local affections, such as dysentery, hospital-gangrene, and other diseases, we should endeavour either to remove the patient from their influence, or to render the infected place healthy and habitable. The principal means which are calculated to deprive the air of its deleterious qualities, consist in preventing the sick from being crowded together, and in facilitating the frequent renewal of the atmosphere by the use of fire, which is calculated at the same time to correct its humidity, or in producing a decomposition of the animal or vegetable matters which float in it. This object may be easily accomplished by fumigations with chlorite or the hydrochloric acid, the former of which, however, should be preferred. In some cases, the patient should be confined in a dark room, especially when he is extremely irritable, has violent fever, and there is reason to apprehend hemorrhage; when he is feeble, however, and dropsical, and the wound is pale, and insensible, he should by all means be confined in a clear apartment. This circumstance will have a tendency to produce a very favourable and universal excitement.

The bed of the patient should have the same qualities as that which was described in one of the preceding sections. It should be composed of elastic substances, which are not liable to become warm, or to absorb the fluids which exhale from the wound. Hair mattresses should always be preferred to those of wool: feather beds should never be employed. The coverings should always be light and proportioned to the degree of heat necessary for the comfort of the patient.

The regimen which should be prescribed after the operation, must vary according to the nature of the case, the age and temperament of the patient, his constitution, his idiosyncrasy and habits, and according to the climate, and season of the year.

A person who has just undergone a severe operation should generally be considered as suffering from an inflammatory affection, and should consequently not be permitted to take any thing for the first twelve or fifteen hours, but diluent drinks.

About the fourth or fifth day, he may make use of broths, gruel, or the breast of a fowl, provided the operation is of such a nature as not to give rise to violent fever, or profuse suppuration, and the *primæ viæ* present no symptoms of irritation; for when these occur, the diet should be strictly antiphlogistic until there be an abatement of the symptoms. As a general rule, the patient should never be confined to too strict a regimen, nor should he be permitted to take too great a quantity of food at a time: for, in the one case, his system will become enfeebled, and his digestive functions impaired by occasioning too great a degree of susceptibility of the stomach; and, in the other, which is still more dangerous, his digestive organs will become the centre of a habitual fluxion which will give rise to severe affections, and interrupt the healing of the wound.

The food of the patient should be perfectly healthy and easy of digestion, and should be adapted, both as regards its nature and quantity, to the character and intensity of the symptoms. His drinks should consist of infusions or decoctions of vegetable substances, and should be either mucilaginous, acidulated, aromatic, bitter, &c. according to the indications of the case.

Immediately after an operation, and until all the inflammatory symptoms which it occasions have disappeared, the patient should almost always observe the most perfect rest, not only in case the operation has been performed upon the head, neck, chest, or superior extremities, but even when it is intended merely to establish a suppuration or an incipient cicatrization. Under these circumstances, we should prescribe such exercise as may be adapted to the nature of the affection, and the part upon which the operation has been performed. As a general rule, we should give a preference to foot exercise, not carried so far as to produce fatigue, whenever the patient is able to go out; but when this is impracticable, he may exercise either upon horse-back or in a carriage, taking care at the same time not to venture out when the weather is unpleasant.

It may generally be regarded as a very favourable circumstance to be able to induce sleep after an extremely painful operation; yet care should be taken not to permit the patient to sleep too long at a time, because, if this be neglected, it will inevitably produce, instead of the moral and physical quietude which might reasonably be expected to arise from it, and instead of preventing the various symptoms which frequently attend painful operations, an increase of debility, and favour the congestion of the brain. If too much sleep, however, be injurious, it must be obvious also that protracted watchfulness can not be less dangerous, by producing a general and injurious excitement; so that the best method will be to observe an intermediate course, and to treat the patient according to the indications which are presented.

But above all, it is extremely important to keep the patient's mind in the most perfect state of tranquillity. Every

severe moral impression is injurious, and if the patient be feeble or extremely irritable, it may even be dangerous: anger and joy should likewise be carefully avoided, more especially as they sometimes produce convulsions, tetanus, and even fatal syncopies; while affliction and melancholy debilitate the action of the heart, of the lungs and the stomach, and produce a disturbance in the assimilative functions; whence result emaciation, marasmus, dropsical infiltrations of the cellular tissue, hectic fever and death.



CHAPTER II.

OF THE RULES CONCERNING COMMON SURGICAL OPERATIONS.

SECTION I.

Of the Elementary Operations.

Under this title will be included the most simple mechanical actions which the healing art applies to the treatment of diseases, and which may be regarded as the necessary elements of almost all the grand operations in surgery. They consist, first, of the puncture, second, of the division with cutting instruments; third, of the division with tearing or lacerating instruments; fourth, of the division with the ligature; fifth, of reunion; sixth, of reduction; seventh, of compression, and eighth, of extraction.

PUNCTURE.

By the term puncture is to be understood the first step of the ordinary incisions, during which the point of the bistoury is plunged perpendicularly into the part which is to be divided. In performing this operation, the surgeon holds the bistoury like a writing pen, (the edge looking towards the palm of the hand, and the middle finger being applied upon the side of the blade, at a greater or less distance from the point, according to the depth of the incision,) and plunges it perpendicularly through the surface of the parts which are to be previously tightened, taking care to proportion the effort to the difficulty which the instrument experiences in penetrating, and until the want of resistance, which may be easily appreciated by habit, indicates that it has arrived at the desired depth. When this is found to be the case, the blade is to be withdrawn in the direction in which it entered.

DIVISIONS WITH CUTTING INSTRUMENTS.

The solutions of continuity by cutting instruments are called incisions, and form the bases of a great number of surgical operations which are necessary for opening abscesses, or removing tumours or diseased parts. The most simple, as well as the most common, are performed either with the bistoury alone, or with the bistoury carried upon a grooved director, and are made either from without inwards, by pressing the instrument upon the parts, or from within outwards by raising these parts.

In order to perform them successfully, it is necessary:

I.—That the instrument should be perfectly sharp, and clean.

II.—That the parts through which the incisions are to be made, should be properly tightened.

III.—That they should be directed parallel to the axis of the part, in order to avoid interfering with the vessels or nerves, which generally run in this direction.

IV.—That the surgeon should divide the parts rather by making the instrument undergo a sawing motion than by pressing upon it.

V.—That they should be made as rapidly as possible, taking care at the same time not to let this interfere with the safety of the operation.

VI.—That the surgeon should make the whole incision with a single stroke of the instrument, unless there be particular indications which oblige him to divide the tissues layer after layer, in order to avoid injuring the subjacent parts.

VII.—That their extent should be sufficient for the purpose for which they are made.

VIII. That they should be of equal depth at every point of their extent.

IX.—That the instrument should not be carried farther than is absolutely necessary, and that the operator should take care not to wound himself, the assistants or the patient.

The different modes of holding the bistoury in making the different kinds of incisions, may be easily reduced to four, which we shall presently point out, in order to avoid the frequent repetitions which we should otherwise be obliged to make in the course of the work.

First position.—In the first position, the bistoury should be seized at the point of union of the handle and the blade with the thumb, the index and middle fingers, and be held like a writing pen, by turning the back or the edge of the blade to the palm of the hand, according to the circumstances of the case.

Second position.—In the second position, the bistoury should be held at its middle with the thumb and middle finger, the handle of the instrument being secured in the palm of the hand by the ring and little fingers, while the index-finger is slightly extended upon the back of the blade.

Third position.—In this position the instrument should be

held precisely in the same manner as in the second, with the exception that its edge should be directed upwards, and that its handle should be held in the palm of the hand with the last three fingers, while the thumb and index finger are placed on each side of its middle.

Fourth position.—In the fourth position, the instrument should be held between the thumb and middle finger placed upon each side of the joint of the bistoury, while the index finger should rest against the side of the blade, and the ring-finger against the side of the handle: the little finger should remain perfectly free.

The manner of making the incisions must vary according to the indications which they are intended to fulfil: we shall, therefore, point out the rules which are applicable to each of them in particular.

STRAIGHT INCISION.

The straight incision is used in opening abscesses, and is performed either from without inwards, by pressing upon the instrument, from within outwards, by raising the parts, or through a fold of the skin.

In making the straight incision from without inwards, the surgeon should tighten the skin with the thumb and index-finger of one hand, while with the other he holds the bistoury in the second position, and carries its point in the space between the thumb and index-finger of the hand which is employed in tightening the parts, and plunges it in a direction perpendicular to the surface of the integuments, until it has arrived at a sufficient depth, after which the wrist should be lowered, so as to give the blade a horizontal direction, and to enable the operator to continue his pressure. As soon as the incision has received its proper extent, the instrument is to be withdrawn in a perpendicular direction by elevating the wrist, in order to terminate the incision as neatly as it was begun.

In the straight incision from within outwards, the surgeon should apply his hand upon the parts so as to render them tense, and hold the bistoury in the third position. He should then carry its point to within an inch of the ulnar edge of the first hand, and introduce it perpendicularly to the surface of the part. When the instrument has penetrated to the desired depth, the operator should give it an oblique direction by depressing the point, and push it either forwards, or from right to left, if it be held in the right hand, or from left to right, if it be held in the left hand; and, as soon as the division is accomplished, it should be withdrawn by elevating its point. In making this incision care should be taken not to give the instrument an entirely vertical, or too inclined a direction, because, if this be done, there will be danger either of penetrating too deeply, or of making but a superficial incision.

There is another method of making the straight incision through the integuments, so as to preserve the subjacent parts,

and this consists in pinching up the skin with the thumb and index-finger of each hand, so as to form a fold, one of the extremities of which should be intrusted to the care of an assistant, while the surgeon holds the other with his left hand, and divides it, either from its free margin to its base, by holding the bistoury in the second position, or from its base to its margin, by carrying the bistoury, held in the third position, from within outwards.

When the operator is obliged to make the straight incision upon very important parts, as, for instance, upon a herniary sac, or in case he wishes to remove small tumours by amputating them at their base, or remove them entirely, he should proceed differently, according to the indications of the case. If he wishes to expose a part without injuring it with the instrument, he should pinch up the tissues by which it is covered with a pair of dissecting-forceps, and holding the bistoury in the second position, with the exception that the blade should rest flat upon the parts, and the edge look towards those which are to be divided, he should remove these tissues, layer after layer, by depressing the edge so as to effect their division, and then elevate it, in order to detach them. In case the tumour is small, and he wishes to remove it by a single stroke, he should raise it as far as possible; and then, resting the edge of a convex bistoury upon its base, divide it by drawing the blade of the instrument from its handle to its point, taking care, as in the preceding case, to depress the edge on commencing the incision, and to elevate it slightly on terminating it.

CRUCIAL INCISION.

The crucial incision is always necessary when we wish to remove a tumour, so as to preserve the integuments, or to expose a diseased structure. It consists of two straight incisions from without inwards, the first of which, being directed from left to right, is intersected at a right angle by the second, which is performed by holding the bistoury in the same position as in the transverse incision.

Another method of making the crucial incision consists in holding the bistoury in the third position, and introducing its blade flat under the edges of the wound. When it has arrived at the place where the incision is to be commenced, the parts are to be divided from within outwards by a sweeping movement of the instrument; and the operation is to be completed by carrying its point towards its base, so as to meet the principal incision, which must always be made before the other is begun.

THE T INCISION.

The T incision is performed precisely in the same manner as the preceding, with the exception, that instead of two, it is only necessary to make one perpendicular section.

THE V INCISION.

This incision is formed of two straight incisions which are united at one of their extremities, and are more or less separated at the other. In performing it, the operator should observe the same rules as in the incisions from without inwards, or from within outwards.

ELLIPTIC INCISION.

In making the elliptic incision, which should always be used in removing a tumour or diseased structure with the integuments by which it is covered, it is necessary, 1st, that it should be made by two strokes of the instrument, one for each half of the ellipsis; 2dly, that the parts should be rendered sufficiently tense; 3dly, that the blade of the instrument should be held perpendicularly to the surface of the parts, in order that the edges of the incision may be neat and of equal thickness; and lastly, that the operator should always be cool and deliberate, in order to be able to commence and terminate each ellipsis at the proper point, and to give each its proper degree of curvature.

In performing this operation, the surgeon should extend the skin parallel to the direction of the incision, and in the same manner as in the incisions from without inwards, if the tumour be small; but if it be large, he should stretch the integuments on the side next to him with the ulnar edge of the left hand, while an assistant stretches them on the other side, in order to render them sufficiently tense; then holding the bistoury in the second position, he makes the first semi-elliptic incision on the side next himself, commencing at the inferior part of the tumour, and after having given it the necessary extent, he makes the second incision precisely in the same manner, taking care to connect its extremities with those of the first.

Whenever we make a crucial, an elliptic, or a T, or V incision, it is always necessary to dissect up the divided parts. To accomplish this, the operator should take hold of the edge of the incision with the thumb and index-finger of the left hand, and taking the bistoury in the first position, with the edge directed alternately towards the palm of the hand and the extremity of the fingers, he should carry the blade from one angle of the wound to the other, until the flap is completely formed.

INCISIONS WITH THE BISTOURY UPON THE DIRECTOR.

These incisions are used in the operations for the cure of strangulated parts, either for the purpose of dilating an opening, or of making a counter-opening: they always differ according to the nature of the case.

In the operations for the removal of strangulated parts, where there is already an opening sufficiently large to admit of the introduction of the finger, or where such an opening is

practicable, the incision should be made by means of a probe-pointed bistoury carried upon the finger, and in the following manner. The index finger is to be introduced into the parts, and, after having carefully ascertained their disposition, it is to be placed in such a manner that its palmar surface shall be directed towards the integuments. When this has been done, the blade of the bistoury is to be glided upon it, and as soon as the extremity of the instrument has arrived at the point where the incision is to terminate, the edge should be directed towards the parts which are to be divided by a kind of sawing motion.

In case the finger can not be used as a conductor, the operator should substitute the grooved-director, and make use of the common straight bistoury. Under these circumstances, the incision must be performed differently, accordingly as there is already an opening capable of admitting the groove, or as there are two, or as the operator is obliged to make a counter-opening. In all cases, however, before the incision is made, the operator should carefully extend the integuments and ascertain that no important organ intervenes between the groove and the parts which are to be divided.

When there is already an opening, the operator should carefully extend the integuments with the ulnar edge and palm of the left hand, and introduce the director, held between the thumb and index finger of the other, to a proper depth, and in the direction of the incision. When this has been done, the left hand is to be turned upon its dorsal surface, and the director is to be held between the thumb and middle finger, while the index-finger is extended upon it, in order to make its point project under the integuments. A common bistoury, held in the right hand in the third position, is then to be passed into the groove of the director, and the section is to be effected by giving the instrument an inclination of from 25 to 30 degrees, and according to the method of making the incision from within outwards. When the section is completed, the bistoury and director are to be withdrawn, taking care always not to separate them until they are completely disengaged. In case the operator makes the incision either towards or from himself, or from left to right, he should always observe the same rules; and it is only in those cases where the incision is made from right to left, as regards the patient, that the bistoury should be held in the left hand, and the director in the right.

In case there are two openings, and it is necessary to divide the soft parts by which they are separated, the surgeon should introduce the grooved-director into one of the orifices, and bring its point out at the other, and then proceed to divide the parts in the manner we have already pointed out.

In making counter-openings, the director should be introduced into the place where the opening is to be made, and its point should be elevated, by lowering the wrist, so as to ren-

der the parts prominent. The point of the bistoury, which is to be held in the right hand like a writing pen, is to be carried upon the projection which is formed by the director, and plunged in a perpendicular direction until it has arrived in the groove of the instrument. When this has been carefully ascertained, the incision should be prolonged by pressing upon the bistoury and directing it more or less obliquely. This operation may also be performed according to the following method, which is perhaps safer than even the one which we have just described. The director is to be introduced, so as to form a projection under the integuments, while the surgeon holding the bistoury in the second position, makes an incision through the skin and the subjacent tissues from without inwards upon the extremity of the director; and then changing the position of the bistoury, and holding it like a writing pen, with its edge upwards, he introduces the point of the instrument into the groove, and makes the incision by bringing it to a perpendicular direction.

TEARING AND LACERATING.

The division of parts by the operation of tearing or lacerating should only be preferred in those cases where the action of cutting instruments is not sufficient to effect a cure; for it is well known, that, although this method has the advantage of abridging the duration of the operation and of preventing hemorrhage, it generally produces a great deal of pain and a very intense consecutive inflammation.

The operation of tearing should only be resorted to in those cases where the tissues are lax and unresisting, as the fibro-cellular tissue which invests certain tumours or organs, such as the testicle, for example, or a loop of intestine of a herniary sac, or the lips of a recently cicatrized wound. The operation is performed either by gently pulling at the part which is to be detached, after the division of the integuments, or by means of the finger, or a firm and blunt instrument.

The operation of lacerating consists in seizing the adherent part, and destroying its connexions with the rest of the body. If this part present little resistance, it may generally be removed by means of a pair of dressing or polypus forceps; but if its adhesion be rather strong, the operator will be obliged to make use of Museux's forceps. In performing the operation, the tumour should be seized with one of the instruments to which we have just alluded, and elevated in order to detach it from the adjacent parts. This may be accomplished by twisting it, at the same time that the operator exerts upon it a degree of traction proportioned to its resistance.

DIVISION WITH THE LIGATURE.

The ligature, or the constriction which is exerted by a ligature or any other narrow and ductile substance upon a living or diseased structure, acts in two different ways, either by di-

viding the tissues, like a blunt instrument, or by exerting such a degree of compression as to interrupt the circulation, and produce mortification and sloughing. The operation is performed by means of the ligature alone, or secured to an instrument, either for the purpose of facilitating its application, or of favouring its effects. The ligatures should be made of silk, thread, or hemp, the latter of which, however, are preferable to the former, because they are not so susceptible of being altered by the heat and moisture of the parts; in some instances, however, either may be used with equal advantage, and the surgeon may even be obliged to employ a leaden or flexible silver wire. These different ligatures may always be applied alone in the removal of circumscribed tumours, which have a narrow base, and are situated on the external parts of the body; but when they are neither circumscribed nor pedunculous, and are seated in some cavity, at a considerable depth, the ligature can only be applied by previously circumscribing the parts with a curved needle, either alone or mounted upon a handle; and when it is deeply seated in a narrow cavity, the operator should introduce the noose of the ligature either upon the finger, or by means of a common porte-meche, or by means of the double canula of Levret, or Desault. If it be impossible, on account of the depth at which the tumour is situated, to make an ordinary knot, the operator should endeavour to produce such a degree of constriction, by means of a tight knot, as shall be able to effect a slow and gradual division of the tissues.

In case the tumour is superficial and pedunculous, and the operator is anxious to avoid using the bistoury, it may be removed by a thin silk ligature, with which the narrow portion of the tumour is to be embraced as near as possible to the surface by which it adheres, and by making a simple knot, each end of the ligature should be drawn until the tumour is completely detached. In this case, the ligature acts like a cutting instrument, though it somewhat contuses the parts, and produces a greater degree of pain. When the tumour is more voluminous, and has a large base, it is impossible to remove it by simply drawing the ligature, for this can only be done by exerting such a degree of compression as shall be able to produce a slow division of the parts by the ulceration of the tissues and the gangrene of the whole humour. To accomplish this, the operator should employ a broad ligature, composed of several strands of thread or silk, which should be united, and tied around the base of the tumour with sufficient force to intercept the circulation of the parts. The ligature should be tied into two or three knots, and the tumour should be covered with lint and compresses, in order to absorb the fluids which are discharged from the mortified tissues and the circular ulceration produced by the ligature. If, after the ligature has been thus applied, the parts retain their sensibility, and slowly augment in size, we may rest assured that the constriction is

insufficient. If, on the contrary, the tumour soon becomes insensible and swollen, and acquires in a short time, a livid purple colour, the parts should by no means be disturbed; for there will soon supervene symptoms of gangrene and the tumour will slough. If the tumour be extremely large, and there is reason to apprehend that a separation will not take place, either because the ligature has not been drawn sufficiently tight, or because it does not produce a sufficient degree of constriction, on account of the diminution of the parts in consequence of the ulceration, the base of the tumour should be traversed perpendicularly to its axis, either with a straight or curved needle, armed with a double ligature, the ends of which are to be brought together upon the sides of the tumour and tied separately, so as to make a double section: it will seldom be necessary, however, to resort to such measures. It will suffice, in fact, in most cases, to give the ligature a degree of constriction proportioned to the size and consistence of the tumour, and so strong as to produce gangrene. When, notwithstanding the methodic application of the ligature, the tumour is slow in becoming detached, its separation should by all means be hastened, by applying a second or third ligature, or even a greater number, if the circumstances of the case demand it; or by exerting upon it a slow and gradual constriction with the common canula, or the double canula of Levret, especially when it is situated in a cavity, such as the ear, the nose, or the vagina.

If the tumour be situated rather superficially, the first of these instruments will generally be sufficient, but in cases of an opposite character, recourse should be had to the second. In using the canula, which is open at one extremity, and bifurcated at the other, the two ends of the ligature are to be passed through the ring of the instrument, so as to form a noose with which the tumour is to be surrounded. When this has been done, the instrument should be pressed against the tumour, and the two ends of the ligature should be drawn tightly, and secured to the bifurcated extremity of the canula by several circular turns. After the operation is completed, the ligature should be tightened in proportion as it becomes relaxed; and by this means the tumour will become gradually detached.

In using the double canula of Levret, the ends of the wire should be introduced at the upper extremity of the instrument, and one of them should be secured to the nearest ring, while the other is to be kept loose. The peduncle of the tumour should then be surrounded with the loop of the wire, which is to be drawn tightly at its free extremity, and when the constriction is sufficient, it should be secured to the other ring of the instrument. In order to produce sloughing and the separation of the tumour, the wire should be daily tightened.

In some cases, great advantage may be derived from the use of a ball-constrictor, or the cap-canula of Dr. Mayor, an ac-

count of which will be given in speaking of the ligature en masse.

REUNION.

Reunion consists in the approximation of divided parts in order to favour their adhesion. It should only be attempted when the surfaces which are to be united are bloody, or in a state of suppuration. The parts, therefore, should always be put in the most favourable condition; and in order to effect this, it is frequently necessary to destroy the cicatrices by which they are covered, by means of the knife or caustic. When this first indication has been fulfilled, the parts should be put in the most favourable situation for the approximation of their surfaces, and their adhesion should be promoted by means of the suture, or a uniting bandage. Every thing that may have a tendency to interrupt the process of cicatrization should be carefully removed, and the inflammation should be combated by regimen, rest, blood-letting, diluent drinks, and emollient applications.

REDUCTION.

Reduction is an operation which consists in restoring displaced parts to their natural situation; and in order to effect this, it is necessary that the muscles, by which the parts are surrounded, should be in a state of complete relaxation. To accomplish this, it will generally be sufficient to place the parts in a favourable position; but if this does not produce the desired effect, we should endeavour to prevent the contraction of the muscles during the operation by fixing the attention of the patient, in order that he may forget to resist the efforts which the surgeon is obliged to make for the purpose of producing a sufficient degree of extension and counter-extension. In all cases, recourse should be had, if necessary, to the employment of the warm bath, blood-letting, and narcotics; but they should only be prescribed when there are no symptoms to contra-indicate their use. The surgeon also, before he attempts the reduction, should carefully ascertain the nature of the causes by which the displacement has been produced, and the direction in which the parts are to be drawn or pushed, in order to restore them to their natural situation. It is necessary, moreover, in cases of dislocation, or displacement of the articular surfaces of the bones, that the power which is employed in making the counter-extension should have a solid point of support in order to resist the efforts of the pulling motions which are required in the operation. The most proper point of support, for this purpose, is a strong hook secured in a wall or some other place; for the same object can never be effected by the combined efforts of several assistants who make the counter-extension by means of a fillet. Upon this subject,

however, we shall speak more fully in our observations upon hernia and dislocations.

COMPRESSION.

Compression is the action of pressing the tissues in such a manner as to reduce them to a smaller size. When this operation is performed in cavities, and acts from within outwards, it is called dilatation, and is intended either for the purpose of enlarging canals, and of preventing the reunion of their divided parietes, of enlarging natural or artificial openings, or of superceding the necessity of an incision in some of the operations. It is in this manner, that, according to the method of Leblanc, we dilate the inguinal ring, instead of dividing it, for the purpose of effecting the reduction of a strangulated hernia. In performing the operation of dilatation, the surgeon should either employ dossils or tents of lint, balls of iris, or gentian, prepared sponge, catgut, or leaden wires, different canulæ or directors, either hollow or solid, gum-elastic, catheters and other similar instruments. Compression, properly so called, is often useful for the purpose of approximating the parietes of divided vessels, as in the operation for varices; for the purpose of diminishing the extent of the soft cavities, after the removal of collections of fluids, as in the operation of paracentesis; for obliterating cysts; for facilitating the evacuation of infiltrated or extravasated fluids, and various other purposes.

EXTRACTION.

Extraction is an operation which consists in removing foreign bodies from the internal parts of the body. The different modes of extraction are subject to particular rules which will be pointed out in a future part of this work, under the heads of cataract, urinary calculi, foreign bodies in the nose, ears, larynx, œsophagus, vagina, and other parts.

SECTION II.

*Of the Common Operations in Surgery.**

VACCINATION.

This operation consists in introducing into the system a peculiar virus, called vaccine matter, which has the power of preventing the development or dangers of the small-pox.

The vaccine matter is furnished directly from the pustules which sometimes appear upon the udders of the cow, either

* Under this title, we shall treat of the different operations which are in daily use, and which require but little anatomical knowledge on the part of the surgeon; they may be easily performed and are generally unattended with danger.

spontaneously, or from the contact of the fluids which are discharged from the feet of horses that are affected with the disease called "*water in the legs*;" or, what is still better, it may be obtained from a vaccine pustule of the human subject. This method, which is unquestionably the most certain, as well as the most convenient that can be employed, consists in opening one of these pustules by means of a lancet or sharp needle, and in receiving upon the point of the instrument the small transparent drop of matter which is formed at the instant that the lancet is plunged into the pustule. When neither of these methods, however, can be employed, we may make use of the dried scab, which, in order to be fit for vaccination, should be removed from the arm between the sixth and ninth day: it should be white and transparent, or somewhat yellowish, and should be preserved between two pieces of glass, or in a capillary tube, and be thus protected from the contact of air, light, and moisture. Before using this matter, it should be carefully bruised upon a piece of glass, with the point of a lancet dipped in cold water.

The operation is usually performed upon the external surface of the arm, below the insertion of the deltoid muscle. The operator, taking hold of the internal and posterior part of the arm, stretches the integuments, and holding the lancet flat in the right hand, between the thumb and the index and middle fingers, plunges it horizontally under the epidermis, to the distance of about one line and a half, and leaves it there for a few seconds, and then withdraws it. In this manner, three or four punctures should be made in each arm, taking care to leave sufficient space between them that the red areolæ, by which they become afterwards surrounded, may not unite. This precaution, although it is of little advantage in an adult, is extremely important in children, in whom it sometimes gives rise to the development of erysipelas.

The operation may be performed at any period of life, but as a general rule it should not be performed upon infants before they are six or eight weeks of age.

PUNCTURES AND SCARIFICATIONS.

By the word puncture are to be understood those narrow and superficial solutions of continuity, which are usually confined to the skin, and are made with the point of a lancet or a scarifier.

Scarifications are small incisions which extend through the skin and the subjacent cellular tissue, and are made with the point of the bistoury.

Punctures are intended to disgorge the blood-vessels of the mucous membranes, and are made with more safety with the lancet than the scarifier; but in using the latter instrument, the operator has the advantage of making a great number of incisions at the same time, and of thus abridging the duration

of the pain: it should only be employed, however, in operating on a large and even surface.

In making punctures with the lancet, the integuments should be carefully stretched with the thumb and index finger of the left hand, while the operator holding the instrument in his right hand, applies the extremity of the edge upon the skin in such a manner as to make several small longitudinal and parallel wounds, from one-fourth to half a line in depth. This operation may also be performed by opening the lancet and holding it like a writing pen, and plunging the point of the instrument perpendicularly and repeatedly into the parts, to the depth of about half a line. In using the common scarifier, the instrument should be accurately applied to the parts, and the operation repeated until there is a sufficient number of incisions. The depth of the incisions should be regulated by the circumstances of the case.

In making scarifications, the operator may employ a straight bistoury, with a sharp and narrow blade, which should be held in the second position, and its point should either be slightly and repeatedly plunged into the parts, or each puncture may be terminated by a small incision.

After the punctures or scarifications have been thus made, their effects should be promoted by such means as shall be in relation with the indications which they are intended to fulfil.

If they are intended to act as a stimulus to parts that are the seat of chronic and indolent engorgements, or to produce a powerful revulsive effect, it will be highly important to make use of stimulating applications; but if they are merely intended to give vent to infiltrated fluids, nothing else will be necessary than to apply a sufficient degree of pressure to promote their discharge.

If they are performed upon gangrenous parts, their effects should not only be promoted by pressure, so as to give rise to the discharge of the fetid fluids, but likewise by filling them with absorbent, aromatic or stimulating powders.

When they are performed for the purpose of producing a strong derivation, their action should be favoured by the use of frictions or irritating lotions; but in case we wish merely to produce a simple fluxion, emollient applications, or dry frictions will answer every purpose.

Finally, when they are performed with the intention of producing sanguineous evacuations, we should always employ emollient applications, and sometimes even cups.

APPLICATION OF CUPS.

The application of cups varies according to the nature of the instrument. In using the exhausting pump, all that is necessary, is to apply the instrument upon the part, to empty it of its air by means of several strokes of the piston, to close the stop-cock and detach the pump.

The bdellometer, which is nothing else than a large cup, provided with a scarifier, which is made to act during the exhaustion of the air, is used precisely in the same manner. It has this advantage, that, without being obliged to displace it, the operator may obtain several ounces of blood by making the fluid run through the stop-cock in proportion as it accumulates in the interior of the instrument.

In using the common cup, we should previously rarify the air within the vessel, either by dipping it in warm water, or by burning a piece of blotting paper, or, what is still better, a piece of dry cotton or tow in its cavity, or by holding it a few seconds over the flame of a lamp, containing spirits of wine, or by introducing into the cavity of the cup a few balls of cotton, dipped in alcohol. This last plan is decidedly superior to any of the others to which we have alluded, and should therefore always be preferred. The vessel being held in the right hand, with the orifice turned upwards, the operator takes a ball of cotton, with a pair of dressing forceps held in his left hand, dips it in alcohol, and after having lighted it, he throws it into the cavity of the cup. As soon as this has been done, the vessel is to be applied upon the skin, taking care to prevent the air from entering the cavity of the instrument. The air soon becomes rarified by the combustion of the alcohol, and produces an afflux of blood, together with redness and tumefaction, at the same time that the vessel adheres strongly to the parts in consequence of the pressure of the atmosphere. This effect may be favoured by pouring a little cold water upon the surface of the cup while it is still warm; for, by this means, the temperature of the air within it will become suddenly depressed and condensed.

If the intention be to produce merely an afflux of blood to the parts, the cup should be left on for a longer or shorter period, or it may be repeatedly replaced upon the same part.

If it be intended to produce, in addition to this afflux of blood, a disorgement of the vessels, the parts should be scarified previously to applying the cups, taking care at the same time to sponge the small incisions with a little warm water.

In order to induce a greater afflux and discharge of blood, the parts should not be scarified until after the application and removal of the cups. In many instances, where it is desirable, a severe local inflammation may be produced by the application of a blister to the part that has been previously subjected to the application of cups and scarifications.*

* For a more detailed account of the application of cups, the reader may consult Mapleson's excellent Treatise on the Art of Cupping, 12mo. London, 1813.—S. D. G.

APPLICATION OF LEECHES.

In applying leeches, great care should always be taken to employ such only as are fresh, active and of a middle size.—The parts upon which they are to be applied, should be previously shaved, cleansed with a sponge and warm water, and rubbed or moistened with a little milk or sweetened water.

They may be applied upon almost every part of the body, but they will bite more readily where the skin is delicate and vascular. As a general rule, they should never be applied, unless there be peculiar indications, 1st, near the orifices of the ear, the mouth, nose, vagina, and rectum; 2ndly, upon parts which are abundantly supplied with very loose cellular tissue, as the eyelids, the axillæ, and the scrotum; 3rdly, upon parts that are traversed by a great number of subcutaneous blood-vessels or nerves, more especially in females and children; and finally, great care should always be taken never to apply them upon parts that are in a state of inflammation.

While walking the clinical wards of the Philadelphia Alms-house Infirmary in 1827, the attending surgeon pointed out a case of syphilis in which nearly one half of the penis had sloughed away in consequence of the imprudent application of leeches. From this, and from several other cases that have since come under my notice, I am inclined to believe that leeches should never be applied to parts that are highly inflamed: much more benefit will be derived by applying them in the neighbourhood of the affected part.

The best mode of applying leeches, is to put them in a piece of fine cloth, rolled up in the form of a pouch, in which they should be dried and gently warmed, by holding it in the palm of the hand or near a fire, previously to their application. This last precaution, however, is perfectly useless, if, as should always be done, they be plunged for two or three minutes into warm water. When they are sufficiently excited, which may be easily known by the energy of their movements, they should be carefully applied upon the parts, and kept there by means of the hand or a glass.

If it be intended to apply them upon a narrow part, as the anus, for instance, they should be put into a small glass, the opening of which should be placed upon the parts, and when the leeches are fixed, the vessel should be carefully removed.

In applying them near the orifices of certain cavities, as the vulva, and the entrance of the nose, or upon the internal surface of the eyelids, or upon narrow and deep seated parts, as the mouth, the nose, and the vagina, it is necessary to place them one after the other; and if the surface upon which they are to be applied, is of easy access, the leech should be placed into a small cylinder, made of a large quill, cut at both ends, and cleft upon one side in the direction of its length. The orifice of the cylinder, towards which the anterior extremity of the animal is turned, should be applied upon the parts, while the other is to be closed with the finger until the leech is fixed.

If the leech is to be conveyed into a narrow and deep seated part, we may also employ the instrument of Bruninghausen, which is composed of a glass tube and a piston; and if it be intended to apply them to the neck of the uterus, we may add the speculum uteri.

When they fall off, the bleeding may be promoted, if necessary, by fomenting the parts with warm water, in order to detach the coagula which obstruct the orifices of the bites, or we may apply a few cupping glasses, a piece of wet cloth or sponge, or expose the parts to the vapour of warm water. If the leeches remain on too long, they may be removed by throwing a little snuff, salt, or vinegar upon them.

When the bleeding is considerable and continues longer than is desirable, it may usually be arrested by the application of astringent or styptic lotions, or by applying upon each opening a small piece of agaric, or a dossil of lint dipped in gum dragacanth. When this has been done, the parts should be covered with lint and compresses, which are to be secured by means of a bandage. If the bleeding, however, still continues, notwithstanding these applications, recourse should be had to the nitrate of silver, or even to the actual cautery. It has also been recommended in cases of this kind, to place a thin linen compress upon the small wound, and to apply upon it the extremity of a spatula or the handle of a silver spoon, heated so as not to cause pain. By this means, the coagulum soon dries, and prevents farther hemorrhage.

A very ingenious, simple, and successful method of checking the profuse bleeding which frequently ensues from leech-bites, has lately been suggested by Dr. Löwenhardt of Berlin. It consists in bringing the edges of the little wounds into contact by means of a very fine needle and ligature passed through the cuticle. The operation is perfectly free from pain, and immediately stops the hemorrhage. In many instances, the bleeding may also be arrested by the application of a small quantity of powdered alum, or by means of the following paste:

R. Pulv. Bol. Armen.	℥i
Pulv. Catechu.	℥i
Alum ust.	℥ss
Tinct. Opii. q. s.—M.	

PHLEBOTOMY.

A.—General Observations.

The operation of phlebotomy may be performed upon all the superficial middle-sized veins of the body, but it is scarcely ever practised in any except those at the arm, and hand, the ankle, and dorsal surface of the foot, the sides of the neck, the external angle of the eye, or under the tongue.

The mode of bleeding varies in the different parts of the body, and is subject to some essential peculiarities. Before we speak of these, however, we shall give an account of the general rules which are to be observed in all cases of the operation.

The apparatus which is required for blood-letting, consists of a lancet, a bandage, one or two compresses, a basin to receive the blood, and a little clean water and a towel. The operator should take care to have a good lancet, of a proper shape. He should never bleed with any that have been used for opening abscesses, or for the purpose of vaccinating.

When the apparatus has been properly arranged, the next thing to be done, is to put the patient in a favourable position. He may either lie down, sit, or stand up, according to the circumstances of the case. If it be intended to produce syncope, the patient should either sit upon a chair, or observe the erect posture; but if he be apt to faint from the loss of a small quantity of blood, and such fainting can answer no surgical purpose, he should by all means be bled in a recumbent posture.

Whatever may be the place where the operation is to be performed, the vessel should always be previously compressed in order to render it full and prominent. To accomplish this, it is necessary, as we shall point out more fully hereafter, to apply a bandage at a short distance from the point where the opening is to be made, between it and the heart, in order to prevent the return of the venous blood, and enable the vessel to become distended. Care should be taken, however, that this compression shall act only upon the superficial veins, and not intercept the circulation of the arterial blood.

When the vessel has been rendered sufficiently turgid, the operator takes the blade of the lancet, bent to a somewhat acute angle, between the thumb and index finger, and steadying his hand upon the other three fingers, placed at some distance from the vein, he introduces the lancet in an oblique direction into the vessel, until the blood rises up at the point of the instrument.* If the intention be to make but a small opening, the point of the lancet should be introduced perpendicularly, and be withdrawn in the same direction. But, if it be necessary to make a large orifice, the instrument should be introduced obliquely in respect to the surface of the skin, and when it has arrived in the vessel, which may be known by the want of resistance and the appearance of a drop of blood, the incision should be completed, either by raising the wrist, or, as has been lately recommended, by lowering it, in order to elevate the point of the lancet.

When the incision is completed, the operator should withdraw the instrument, taking care at the same time to steady the vessel with the thumb of the left hand, in order to preserve the parallelism of the two openings in the skin and the vein. The necessary quantity of blood being discharged, the bandage should be removed. The flow of blood now generally ceases, though in some cases, where the orifice is large, and the circu-

* When the vein rolls under the skin, the incision should be longitudinal, and transverse, when it is small, and the operator wishes to divide it completely across.

lation active, it still continues. In this circumstance, the bleeding may be readily stopt by placing the thumb of the left hand firmly on the vessel, a little below the puncture, or immediately upon it. When the bleeding has ceased, the blood should be washed off the arm, the edges of the wound should be brought in contact, and the compress applied, and secured by a few turns of a bandage.

In the United States, bleeding is generally performed with the spring-lancet, and although it is not, perhaps, quite so scientific a mode of doing the operation as with the thumb lancet, yet, as it is always perfectly safe and is usually attended with less pain, it is decidedly preferable to every other instrument that has yet been contrived for the purpose. The prejudices against the use of the thumb lancet are extremely great, and it is not unfrequently the case, after having once used it, that you hear your patient declare that he will never be bled with it again.

In performing this operation, there are sometimes difficulties which may be owing either to the smallness of the vessel, to its mobility, or to its partial obliteration, in consequence of previous blood-lettings, or other wounds; or they may arise from a great thickness of the skin, or the adipose cellular tissue which covers the vein, or from a peculiar arrangement of the anatomy of the parts.

The inconveniences resulting from a partial obliteration of the veins, may be remedied by rendering them as turgid as possible, either by immersing the limb for a few minutes in warm water, by tying it firmly with a ligature, or by directing the patient to move his fingers. These means are often capable of rendering even a very small vein sufficiently apparent and turgid to enable the operator to draw the proper quantity of blood, more especially if he be careful to cut the vessel completely across.

In very corpulent people, it sometimes happens, that, notwithstanding the employment of the means to which we have just alluded, the operator is unable to see the vein, although it may be fully developed. All, in fact, that he is able to perceive, in any part of its course, is a small elevation which appears to raise the finger or to transmit to it a kind of undulating motion, when, by frictions upon the surface of the part, the blood is brought from the branches towards the trunk, or when a slight degree of percussion is applied upon the apparent part of the vessel. For a skilful surgeon this is generally sufficient: and by these phenomena he at once recognises the vessel, and has no hesitation in opening it. In this circumstance, it is necessary, if there be danger of missing it, to mark with the nail the place where the lancet is to be introduced, and to plunge the instrument perpendicularly into the vessel, until it has arrived at a sufficient depth. If the vein rests upon an artery or a large nerve, the instrument should be introduced no farther than is absolutely necessary; because, if this precaution be neglected, much trouble and inconvenience will probably be the consequence. It need scarcely be observed,

that when the vein adheres firmly to an artery, and is placed nearly upon the same plane, it should only be opened upon its free border; and, as a general rule, such a vessel should never be punctured when it is possible to find another.

When it is absolutely impossible to find a vein, and bleed-
is indispensably necessary, we should by all means have recourse to the operation of arteriotomy, or to the method which has been proposed by Professor Lisfranc, and which consists in opening the cephalic vein in its passage across the space which exists near the junction of the deltoid and pectoralis major muscles. The operator being armed with a convex bistoury, makes an incision upon the course of the vessel, of about one inch in length, and parallel to the axis of the humerus; and, after the vein has been thus exposed, it is to be opened with a lancet.

B.—BLOOD-LETTING IN THE ARM.

Anatomical disposition.—Bleeding in the arm is generally practised at the bend of the elbow, where there are usually four superficial veins.

The most external of these veins is the cephalic. It is frequently indistinct and is embedded in adipose cellular tissue; it is accompanied by the external cutaneous nerve, from which it derives a few small branches, on a level with the external muscular mass; and above as well as below the epicondyle, it is separated from it by the aponeurotic membrane of the biceps muscle. From this arrangement of the parts, it is evident, that there can be little danger in opening the vein, especially when it is punctured above the middle of the insertion of the biceps. This vessel, therefore, should always be preferred, provided it be sufficiently large.

The vein which is situated at the ulnar edge of the bend of the elbow, is called the basilic. It is no where superficial except in its passage over the muscles at the inner border of the elbow, where it is surrounded by cellular tissue; higher up, it passes between the laminæ of the brachial aponeurosis. The most conspicuous portion of this vein is in contact with the internal muscular fasciculus, and is accompanied by the ramifications of the internal cutaneous nerve, which vary in position, and sometimes surround the vessel by a kind of plexus. In opening this vessel, therefore, at its most conspicuous part, there must evidently be danger of injuring some of the filaments of this nerve. From the intimate connexions also which exist between the vein and the trunk of the internal cutaneous nerve, there will be great risk of injuring the latter, if the former be punctured a little higher up than the muscular prominence, and in its passage through the internal brachial groove; but in most cases this accident may be avoided, by making the incision at the external part of the vessel, or on the side opposite to the nerve.

It is obvious, therefore, from what we have just stated, that

this vein should never be opened, if it be practicable to draw blood from one that may be punctured with more safety.

Between these two veins, at the inferior part of the bend of the arm, is another which is situated either in the median groove, or on its inner or outer side. This vessel, which is called the median vein, soon divides into three branches, of which two only remain superficial, and finally terminate, under the name of median-cephalic and median-basilic, in the two lateral veins above-mentioned.

The median-basilic, as it ascends upwards, passes along the border of the internal muscular prominence, in front of the brachial artery, which communicates to it a very sensible pulsatile motion. It generally crosses the artery, but sometimes, though rarely, it follows the same direction. In the former case, it should be laid down as a general rule never to puncture the vein where it crosses the artery, because, if this precaution be neglected, there will be great danger of wounding this vessel. When, on the contrary, the two vessels proceed parallel and in contact with each other, and, although the danger is nearly the same, yet it will be preferable to open the vein above or below the place where the artery is somewhat farther off than at the middle of the elbow. Here, in fact, the two vessels are more superficial, and are merely separated by a layer of cellular tissue, which is sometimes extremely thin. In all cases, it is highly imprudent to bleed from the median-basilic, especially in very thin persons. In very corpulent individuals, however, the thickness of the subcutaneous cellular layer, and of that which separates the artery and the vein, is such as to permit the lancet to penetrate to a sufficient depth without fear of wounding the artery.

When it is absolutely necessary to open this vessel, great care should be taken to put the arm in a state of pronation; because, in this position, the tendon of the biceps will be rendered tense, and thus depress the artery, while the three muscular projections will become more apparent, and the veins more superficial.

The median-cephalic is somewhat smaller than the preceding, but it is generally more deeply seated and less rolling. It possesses the advantage, that it may be safely opened, especially near its entrance into the cephalic trunk. In puncturing it at this place, there will be seldom any danger of injuring the musculo-cutaneous nerve, which is situated behind it, and does not come in immediate contact with it. At its inferior extremity, however, the vein crosses the origin of the radial artery, and is sometimes in contact with it.

The trunk of the median vein passes generally in a direction parallel to the internal border of the supinator radii longus, and is usually so apparent that it may be opened without difficulty. It is often surrounded by the ramifications of the musculo-cutaneous nerve, and is in relation, at its external part, with one of the branches of this nerve, so that the operation

of bleeding, at this place, appears to be rather dangerous. As a general rule, therefore, the vein should always be opened at its internal border.

Operation.—In bleeding at the elbow, the surgeon takes the limb, and supporting it against the left side of his chest, ties the fillet round it, about one inch and a half or two inches above the bend of the arm, with sufficient tightness to intercept the passage of the blood through all the superficial vessels. As soon as the veins have become sufficiently turgid, and the operator has ascertained the position of the brachial artery, he should stretch the integuments, by drawing them inwards with the fingers of the hand with which he supports the limb, and select the vein and place where the opening is to be made. When this has been done, he should proceed to the operation, which should be performed in the manner already pointed out. Before introducing the lancet, it will sometimes be necessary, in order to render the vein more turgid, to push the blood towards the fillet, by rubbing the arm from below upwards.

Dressing.—When the proper quantity of blood has been removed, the fillet should be untied. The flow of blood now generally ceases; but if it should continue, it may be immediately arrested by placing the thumb of the left hand firmly upon the orifice of the vessel, or a little below the puncture. The blood is then to be washed off the arm, the sides of the wound placed in contact, and the compresses applied, and secured with the fillet, applied round the elbow in the form of a figure of 8, and regularly crossed over the compresses.

The fore-arm should be kept in the semi-flexed position, and the patient should be advised not to move it much until the fillet is removed, which may be done in about thirty-six or forty-eight hours.

When the orifice is small, and the bleeding is easily stopped, all that will be necessary is to approximate the sides of the wound, and to cover them with a piece of court-plaster.

C.—BLOOD-LETTING IN THE HAND.

The most conspicuous vein on the back of the hand is generally the cephalic of the thumb, and it is the one which is commonly opened when it is impracticable to bleed in the arm. The fillet should be tied round the arm, about two inches above the place where the vein is most conspicuous; the hand should then be immersed for a few moments in warm water, and when the vessel has become sufficiently turgid, it should be opened in the manner already pointed out. When the operation is completed, the edges of the wound should be brought in contact, and the compresses should be applied and secured by means of a fillet, carried round the wrist and the hand, in the form of a figure of 8, and regularly crossing over the wound.

D.—BLOOD-LETTING IN THE FOOT.

In bleeding in the foot it is customary to open the internal saphena vein, just above and in front of the ankle; but if this vessel be so small as to render it impossible to open it, the operation may be performed upon one of the superficial veins on the dorsal surface of the foot, or upon the external saphena.

The operation is performed precisely upon the same principles as in other parts; but as the veins are generally small, and the blood flows with some degree of difficulty, the foot should be immersed in warm water, in order to render the vessels more turgid, and promote the bleeding.

E.—BLOOD-LETTING IN THE NECK.

Anatomical disposition.—The external jugulars are the only superficial veins in the neck that are large enough to be opened. Each of them is invested or accompanied, towards the middle of the neck, by branches of the cervical plexus of nerves. It is at a short distance below this part that the vessel should be punctured; because there the vein is more superficial and more frequently single, while higher up it is more indistinct, sometimes bifurcated, and always surrounded, as we have already said, by nervous filaments. The vessel passes obliquely from above downwards, and from before backwards, beneath and parallel to the fibres of the platysma-myoides muscle. From this arrangement of the parts, therefore, it is obvious that the orifice should be made in the direction of the fibres of the muscle, in order that in contracting, they may enlarge the opening and facilitate the bleeding.

Apparatus.—In performing this operation, it is necessary to have two bandages, about one yard and a half in length, three or four compresses, a lancet, a basin, a piece of paste-board, and several strips of English court-plaster.

Operation.—Previously to commencing the operation, several compresses should be placed over the course of the jugular vein, at the inferior part of the neck. Upon these compresses should be applied the central portion of a bandage, one end of which is to be carried in front, and the other behind the chest, and secured by an assistant, who may either hold or tie them under the opposite axilla. The vein being thus rendered sufficiently turgid, is to be steadied with two fingers of the left hand, and opened by a free incision by carrying the lancet from before backwards, and from below upwards. As the blood generally runs down the neck, the receiver should be held exactly over the orifice of the vessel, or its jet may be properly directed by placing below the wound a piece of paste-board bent into a kind of cylinder. The patient should at the same time be requested to move his lower jaw and make strong respiratory efforts, in order to promote the bleeding.

When the proper quantity of blood has been discharged, the fillet should be removed, the edges of the wound brought

into contact, and the court-plaster and compresses applied, and secured by a few turns of a bandage and a cravat. Baron Larrey is of opinion that the pressure should never be removed before the wound is closed, in order to prevent the admission of air; a circumstance, which, in some cases, appears to have been the cause of the sudden death of the patient.

F.—BLOOD-LETTING FROM THE LINGUAL VEINS.

The lingual veins, situated upon the sides of the *frænum linguæ* and immediately below the mucous membrane, are generally so large and distinct as to be opened with the most perfect facility. In performing the operation, the patient being seated in front of a window, opens his mouth as widely as possible and raises his tongue, while the operator prevents the approximation of the jaws by placing a compress or piece of linen between the large grinders. When this has been done, he takes hold of the tongue with the fingers of the left hand, and punctures the vein. The blood generally flows at first with some degree of celerity, but it soon becomes slackened. When this is the case, it is necessary, in order to promote the bleeding, to request the patient to suck his tongue, or to move it rapidly while the jaws are firmly closed.

When the operation is completed, the flow of blood generally ceases; though sometimes, when the orifice is large, or the circulation vigorous, it still continues. In this circumstance, it will be necessary to apply a slight degree of pressure upon the orifice of the vessel, by placing a dossil of lint under the tongue, and keeping the fingers a short time upon that organ.

ARTERIOTOMY.

The only arteries from which blood is ever taken in practice, are the branches of the temporal or occipital artery, which are situated in the neighbourhood of the parts which are to be disgorge, and have the advantage that they may be easily compressed against the subjacent parts, and the bleeding stopped. The anterior branch of the temporal artery, which winds along the sides of the forehead, may generally be easily found and compressed, and is therefore usually preferred. When it is indistinct, however, the trunk itself may be divided, which is always found immediately above the zygomatic process of the temporal bone, about two lines in front of the pavilion of the ear.

Apparatus.—All the apparatus which is required in the operation of arteriotomy, is a straight bistoury, a piece of adhesive plaster, a graduated pyramidal compress, and a bandage, about one yard and a half in length, and three inches wide.

Operation.—Here every preliminary compression will be perfectly useless; and all that is to be done before commencing the operation, is to ascertain the situation and depth of the ves-

sel, and to fix it firmly by applying the extremity of the forefinger over its course, at the place where the opening is to be made. When this has been done, the operator, holding the bistoury in the second position, plunges it perpendicularly into the side of the artery, and divides it in a transverse direction, by depressing the handle of the instrument. The incision should be from five to six lines in extent, in order to enable the blood to flow with ease, and prevent the infiltration of the subjacent cellular tissue. When the necessary quantity of blood has been discharged, the artery should be compressed by applying the finger firmly upon the vessel, a little below the puncture. The parts should then be carefully washed; and, in order to prevent hemorrhage, it will be necessary to employ a proper degree of compression, until the orifice is completely cicatrized.

If the hemorrhage be obstinate, notwithstanding the employment of pressure, it may be arrested, either by cutting the artery completely across at the orifice; by taking it up with a needle and ligature; or by obliterating its caliber by a gradual and constant compression.

Dressing.—The edges of the orifice are to be approximated and kept in contact by a strip of adhesive plaster, covered with the pyramidal compress, and secured by means of a bandage carried round the head. This apparatus should not be removed until after the expiration of three or four days.

G.—DISAGREEABLE CONSEQUENCES OF BLOOD-LETTING.

I.—DIFFICULT FLOW OF BLOOD.

This accident may arise from the tightness of the fillet so as to intercept the course of the blood in the principal artery of the limb. It is characterized by lividity, numbness of the limb, and absence of the pulse. The remedy, therefore, is obvious, and consists in loosing the bandage to such a degree as to enable the pulse to reappear. In some instances, however, it is attributable to an entirely opposite cause; and it will then be necessary, especially when the veins are soft and empty, to tighten the fillet. This circumstance may also be frequently owing to the smallness of the orifice, or to the awkwardness of the operator, who may change the position of the limb or that of the fingers with which he tightens the integuments, and thus destroy the parallelism of the two incisions. In the first case, the lancet should be again introduced, in order to enlarge the orifice; and in the second, it will be necessary to re-establish the parallelism between the two openings, by restoring the limb and the integuments to the position in which they were at the moment of the operation.

It sometimes happens, independently of the causes to which we have just alluded, that the blood may issue guttatum, or its

flow may be completely arrested. If, under these circumstances, the patient becomes pale, has a small, slow pulse, and the symptoms of an approaching or complete syncope, he should be immediately put in a recumbent position, taking care to place his trunk a little higher than his head, so as to facilitate the return of the blood to the brain. His face should be sprinkled with cold water, and his nostrils stimulated with vinegar, some strong aromatic tinctures, or with some of the preparations of ammonia.

II.—ECCHYMOSIS AND THROMBUS.

Both these accidents may be produced by the smallness of the orifice, the want of parallelism between the two openings, the perforation of the two opposite sides of the vein, and the accidental occlusion of the wound, in consequence of the interposition of a small quantity of adipose cellular tissue. In an ecchymosis, the blood is infiltrated in a very small quantity, and is generally absorbed in a short time without the employment of any local applications. In a thrombus, however, especially when it occurs in emaciated individuals, the fluid is immediately collected into a tumour, which may acquire a considerable size, and soon become inflamed and exhibit symptoms of the formation of an abscess.

If a thrombus is observed to form during the operation, the bandage should be immediately removed, and the wound should be closed, and covered with compresses, wetted with vinegar, cold water and alcohol, a solution of the hydro-chlorite of ammonia, or of salt and water.

If more blood be required, it should be drawn from another vein, and, what is still preferable, from a vein in the other arm.

III.—INFLAMMATION OF THE EDGES OF THE WOUND AND OF THE SUBJACENT TISSUES.

a.—Inflammation of the integuments and of the sub-cutaneous cellular tissue.—This accident may result from the imperfect division of the integuments, when the lancet has been bad, so as rather to have lacerated than cut the parts; and especially when the edges of the puncture have not been properly united, and the arm is allowed to move about, so as to make the two sides of the wound rub against, and irritate each other.—The inflammation is sometimes of an erysipelatous or phlegmonous nature, and somewhat diffused; at other times, it is merely a small indolent inflammatory tumour, which terminates in a slow suppuration.

b.—Inflammation of the sub-aponeurotic cellular tissue.—This inflammation is probably often confounded with what has been called inflammation of the fascia of the fore-arm. It is characterized by a deep seated pain, without any remarkable swelling or redness of the integuments. The pain slightly augments under the pressure of the finger, but becomes ex-

tremely severe when the parts are forcibly compressed. The fore-arm and fingers can not be extended without great pain; and, at the end of about a week, there generally takes place a superficial collection of matter below one of the condyles.

c.—Inflammation of the lymphatic vessels.—Inflammation of the lymphatic vessels is commonly produced in consequence of the irritation of the sides of the puncture, or the absorption of an irritating matter. It is characterized by the presence of chord-like substances, evidently indurated absorbents, which extend above and below the orifice, in the direction of the lymphatic vessels. The venous tube remains perfectly free from swelling and induration, but the edges of the puncture are inflamed, and the neighbouring lymphatic ganglia are not only enlarged but extremely painful.

d.—Inflammation of the vein.—Inflammation of the vein, or phlebitis, as it is technically called, may arise from any irritation of the sides of the wound, but most generally in consequence of the employment of a foul lancet. It is never developed until after the inflammation of the wound, and most frequently not until after its cicatrization and the development of an abscess under the cicatrix. It is characterized by a burning pain which is either propagated along the trunk, or the branches of the vein, and by the existence of a hard, firm, and chord-like substance, extending in the direction of the vessel. These local symptoms are sometimes confined to a small extent; but in some cases they are more diffused, and are accompanied by general inflammatory symptoms, more especially by those which constitute what is called adynamic or typhoid fever.

Treatment.—The treatment of these different accidents is precisely the same as that of every local inflammation, modified according to the circumstances of the case. The means which have generally been recommended by surgeons, are, the application of leeches to the adjacent parts, emollient poultices, diluent drinks, rest, and abstinence, and general bleeding, if the symptoms are so intense as to require it. These means are also applicable in cases of phlebitis; but, in addition to them, it will be necessary to resort to such measures as may have a tendency to arrest the progress of the inflammation, and thus prevent the unhappy effects which it produces when it extends to the large venous trunks. To accomplish this, a considerable number of leeches should be applied along the course of the vein, especially if the disease is already developed with some degree of intensity. Before resorting to the application of leeches, however, it will be proper, if the inflammation be in its incipient stage, to cover the limb with small pieces of ice, or if there be much pain, recourse may be had to the application of poultices, moistened with a little laudanum.

In order to prevent the extension of the disease, and produce the adhesion of the parietes of the affected vessel, it has been recommended by Mr. J. Hunter and others, to apply a

compress and bandage above the wound. Abernethy, in order to obtain the same result and prevent the pus from becoming mixed with the blood, advises us to cut the vessel completely across above the orifice. The inflammation may also be successfully combated by the treatment recommended by Dr. Physick, which consists in applying a blister above the affected part, or by applying leeches along the course of the vessel, as has lately been successfully practised in Paris.

IV.—ILL CONSEQUENCES OF A WOUNDED NERVE.

The symptoms which result from the puncture of a nerve, are a disagreeable numbness of the parts, and an extraordinary degree of pain at the moment of the operation, which remains after the bleeding is finished, and is propagated to the parts in which the nerve is distributed. In some instances it is also followed by convulsions, and other unpleasant symptoms.

The ill effects which result from the puncture of a nerve, are either primitive or consecutive. The first, and more especially the pain, are attributable to the partial division of the nervous cord; while the other appears to be the result of the inflammation of the nerve itself, and of the subjacent parts. This opinion is entertained by Mr. Abernethy, and has lately been fully confirmed by M. Martinet in his observations on inflammation of the nerves.

From what we have already said upon this subject, it is obvious, that, in order to remedy this accident, it is necessary to fulfil two indications, one of which consists in dividing the nerve, in order to allay the pain and the other primitive symptoms; and the other, in the employment of an antiphlogistic method of treatment, in order to remove the consecutive inflammation.

In dividing the nerve, all that is necessary is to introduce the lancet to a proper depth, and cut the nerve by raising the point of the instrument. When the nerve is large, it will be proper to employ a bistoury, with which the operator makes a transverse incision above the orifice of the vein, and in such a manner as to be sure to divide the nerve.

V.—WOUND OF THE BRACHIAL ARTERY.

As this accident is decidedly more serious than any other that can possibly accompany blood-letting in the arm, it is extremely important that the surgeon, before commencing the operation, should always carefully ascertain the situation of the artery, and never puncture the median-basilic, especially at the point where the two vessels cross each other, unless there is a considerable interspace between them, and there is no possibility of bleeding in any other vein.

When the lancet has been plunged into the artery, the accident may be readily known by the unusual violence of the jet of blood, by its vermilion colour, by its rapid coagulation, by

the flow of blood being alternately strong and feeble, and isochronous with the pulse, and, more especially, by the suspension of all these phenomena as soon as the brachial artery is compressed at the middle of the arm, by their return as soon as the compression is removed, and by their obstinate persistence, notwithstanding the employment of pressure upon the fore-arm, so as to interrupt the circulation of the blood in the superficial veins.

As soon as this occurrence has been ascertained, the surgeon should compress the artery at the internal part of the arm, in such a manner as to intercept completely the passage of blood through the orifice. When this has been effected, the wound should be covered with a number of compresses, which are to be applied so as to form a cone, and firmly secured by means of a long bandage, put round the elbow in the form of a figure-of-eight.

This treatment, however, is merely palliative; for it can only completely arrest the bleeding when the puncture of the artery is very small, but can never prevent the formation of a diffused or circumscribed aneurism. In this circumstance, it is absolutely necessary to have recourse to the ligature, as the only sure and efficacious means for effecting a permanent cure.—*See Treatment of Aneurism.*

I have lately been informed by my very intelligent friend, Dr. Fickardt, of Easton, Pa, that he has recently met with a case of this description, in which a complete cure was effected by keeping up a constant compression for about ten or fourteen days with a large conical compress. When the wound is quite recent, as was the case in the instance to which we have just alluded, this mode of treatment, if judiciously persisted in, will probably be found to be far more beneficial than has been commonly supposed by practitioners.

SETON.

A seton may be applied to any part of the surface of the body that is supplied with a considerable portion of cellular tissue; but the parts which are most commonly selected for this purpose are the nape of the neck, the chest and the scrotum.

Apparatus.—All the apparatus essential for this operation, is a piece of tape, or a skein of white silk or thread, Professor Boyer's seton-needle, or a straight bistoury, a common eye-probe, a few pledgets of lint, a compress, and bandage.

Operation.—The parts which are situated below the place where the seton is designed to be made, being carefully covered with a piece of cloth, the operator pinches up a fold of the skin, in a direction parallel to the axis of the body, or, what is still better, a little obliquely from above downwards and from right to left, in order to enable the pus to flow with more facility. The superior extremity of this fold should be confided to an assistant, while the inferior is held by the surgeon, who plunges the bistoury, held in the right hand, into its base, pushes it through at the opposite side, and thus makes an incision from below upwards, from five to eight lines in width.

As soon as this has been done, he lets go the fold, and introduces the skein of thread by means of the eye-probe.

In using the seton-needle, it is to be introduced through the base of the fold in the same manner as in the preceding case, and when its point has arrived at the opposite side, it is to be seized and drawn through, together with the skein of thread, which should be previously dipped in sweet-oil.

As the materials recommended by M. Tavernier, and indeed by most other authors, are often attended with considerable trouble, and require the disagreeable operation of changing the silk, it may perhaps not be amiss to state, that some of the late English writers have suggested the idea of using tapes, made of gum elastic, about four or five inches long, and half an inch wide. The needle employed for conveying the tape through the integuments, has no eye, but takes hold of it like a pair of forceps.

First dressing.—When the operation is completed, the parts should be carefully wiped, and the compresses applied and secured by means of a bandage. Care is to be taken to keep the thread on the outside of the wound well covered, and free from the discharge which would make it hard and stiff, and be apt to occasion pain on being drawn into the wound.

Subsequent dressings.—The second dressing should not be applied for three or four days after the operation, until the suppuration has loosened the thread. It consists, like every subsequent dressing, in changing the bandages, and in drawing the thread into the wound.

When the parts have been carefully washed, the portion of the seton nearest the wound is to be smeared with white cerate, fresh butter, or any digestive ointment, and drawn into the wound, and what was there before is to be cut off with a pair of scissors. In this manner, the seton should be drawn once or twice a day, according to the circumstances of the case; and a new thread or skein of silk, should be attached to the preceding one, as often as necessary.

If the discharge should be deficient in quantity, it will be proper, in order to stimulate the surfaces of the wound, to mix a small quantity of the unguentum sabinæ or powdered cantharides with the digestive ointment.

BLISTERS.

Various pharmaceutical preparations have the property, when put in contact with the skin, of raising the epidermis in the form of a vesicle, filled with serous fluid. The one that is now most generally employed, however, is the common blister-plaster; but when this can not be procured, we may make use of old yeast, mixed with the powder of cantharides, or, what is still better, of the daphne gnidium, macerated in warm vinegar. In some instances, a preference is given to the vesicating court-plaster, which is said to have the advantage of occasioning but little irritation in the urinary organs. Finally, when it is intended to avoid this irritation, and to produce a speedy blister, we may resort to the use of the ammoniacal liniment,

or to hot water, which is still more prompt in its effects, and produces an immediate separation of the epidermis.

Application of the blister.—Previously to applying the blister, the parts should be carefully shaved, and rubbed with a piece of cloth dipped in vinegar, so as to produce a slight degree of rubefaction of the skin. In using the common blister plaster, it should be gently warmed, applied firmly upon the parts, covered with a compress, and secured by means of a proper bandage: at the neck and on the superior and inferior extremities, this may generally be done by a few turns of a roller; but on the trunk, and in those parts where a bandage is either inconvenient or insufficient, the plaster may be secured by a few strips of adhesive plaster, carried across its central portion, and fixed to the skin.

The blister plaster is composed of the following ingredients:

℞. Pulv. Cantharidum	℔.j.
Emplastri ceræ	℔.iss.
Adipis suill. præp.	℔.ss.

Previously to adding the powdered cantharides, the wax plaster and lard are to be melted, and allowed to become nearly cold.

If there be danger that the blister will create too much irritation, especially in very young children in whom it may be so severe as to produce sloughing of the skin, or give rise to inflammation of the bladder, it will be of the highest importance to place a piece of silk paper, or thin gauze, wetted with a little vinegar, between it and the integuments. In very nervous or irritable individuals, it will sometimes be necessary to combine a small quantity of opium with the vesicating plaster.

In using hot water, the part may either be plunged into it and soon withdrawn, or our object may be effected by wetting a thick compress and allowing it to remain for a few seconds upon the skin.

First dressing.—As soon as the blister has raised the epidermis, which happens in about ten or twelve hours after the application of the emplastrum lyttæ, and within about thirty minutes after that of the ammoniacal liniment, it should be carefully removed, and the cuticle punctured with a pair of sharp scissors to let out the fluid. The parts should then be dressed with a piece of thin linen, a few beet-leaves, or a piece of blotting paper smeared with fresh butter or cerate, which is to be secured in the same manner as the plaster. When the blister is removed without injuring the epidermis, it produces scarcely any pain; it should always, therefore, be carefully preserved in very irritable persons, and in those cases where it is wished rather to keep up a permanent discharge, than to produce a sudden and severe irritation. When it is intended, however, to produce severe pain, the surgeon must remove the whole of the detached cuticle with a pair of scissors, and dress the excoriated surface with a few beet-leaves or a piece of thin linen.

In this country, physicians are generally in the habit, after the removal of the blister, to dress the parts with a few thin cabbage leaves, previously softened before the fire. This is perhaps the best means that can possibly be resorted to for the purpose of allaying the burning pain which almost invariably results from the application of a blister, and which is so extremely disagreeable to the patient.

Subsequent dressings.—At the second dressing, the cuticle should be carefully detached, if this was not already done at an earlier period, and the excoriated surface should be wiped with a piece of dry linen. The adjacent parts should then be carefully washed, and the blistered surface should be covered with a piece of linen or a few beet-leaves, spread with spermaceti cerate, fresh butter, or any stimulating ointment, accordingly as it is designed to prevent, promote, or augment the suppuration.

The preparations which are most commonly used for this purpose, are the epispastic plaster, and the powdered bark of the daphne gnidium. The quantity of these remedies should always be proportioned to the effect which they are intended to produce; and when this effect is to be but slight, they should always be combined with a small quantity of fresh butter. It not unfrequently happens, however, that they give rise, more especially the former, to a scalding sensation in making water, and most afflicting stranguries. When this takes place, it will be necessary to remove the blister, to clean the excoriated surface of the dermis, to apply emollient fomentations and advise the patient to drink abundantly of mucilaginous drinks. As soon as the patient has recovered from the effects of the preparations to which we have just alluded, the parts may be dressed with the common basilicon or savine ointment, mixed with simple cerate. This application, which has long been a favourite in England, produces a profuse and permanent discharge, without being attended with the inconveniences of the common epispastic salves. By these means, we likewise avoid the danger of fretting the parts, and are enabled to keep up a long continued suppuration. It sometimes happens, however, that, notwithstanding these applications, the discharge completely ceases. Under these circumstances the blister should be converted into an issue, or the plaster should be reapplied in order to produce a new vesication.

The savine ointment was first brought into notice by Mr. Crowther, in 1797, and consists of the following ingredients:

℞. Sabinæ recentis contusæ,	lb. ij
Ceræ flavæ,	lb. j
Adipis suillæ,	lb. v.

The lard and wax being melted, the powdered savine is afterwards to be added and strained. In using this ointment immediately after the removal of the blister, great care should be taken to weaken it by the addition of about one-half or two-thirds of its quantity of white cerate. Its strength, however, should be gradually augmented, according to the circumstances of the case.

A cessation of the discharge, however, does not always indicate a want of irritation of the blister, nor the necessity of increasing the quantity of the stimulating salve; on the contrary, it frequently arises from an excess of irritation which must be combated by emollient poultices, and mucilaginous fomentations, especially when it is accompanied with much redness and pain. If, under these circumstances, the surgeon persists in the employment of irritating applications, the blister will only become more painful, and covered with sore fungous granulations, which it is impossible to cure until the parts have become dry, and which are apt to leave a very disagreeable scar.

ISSUES.

An issue is an ulcer which is made intentionally by the surgeon, and is kept open a certain time for the prevention or cure of a variety of affections.

An issue may be made either with caustic potash, or with a bistoury or lancet. The caustic, however, is now generally preferred, both on account of the salutary irritation which it is apt to produce, and on account of the repugnance or unwillingness of the patient to submit to the use of the bistoury.

An issue may be made upon any part of the surface of the body that has a sufficient quantity of cellular tissue to prevent the caustic from affecting any important organ; but, when there is no particular contra-indication, the surgeon should generally prefer, in the arm, the slight depression which corresponds to the inferior angle of the deltoid muscle, near the outer edge of the biceps flexor cubiti; in the thigh, the depression above the internal condyle, which is bounded in front by the cruralis, and behind by the third head of the adductor, and the biceps femoris; in the leg, the point situated about three or four inches below the internal tuberosity of the tibia, between the inner edge of the bone and the gastrocnemius externus; and in the nape of the neck, the central space between the upper part of the cervical muscles.

Application of the caustic potash.—The place for the issue being fixed upon, the surgeon applies a piece of adhesive plaster, having a hole in its centre proportioned to the extent of the part that is to be destroyed.* When the plaster adheres firmly to the skin, a proper piece of caustic is to be applied upon the opening, surrounded with a small quantity of lint or carded cotton, and secured by another strip of adhesive plaster, a compress and bandage. The size of the piece of potash must vary according to the degree of irritation and the extent of the ulceration which it is designed to produce. Under ordinary circumstances, a piece of about a line and a half or two lines in thickness, is generally sufficient to form an eschar of the size of a quarter of a dollar.

* This hole should ordinarily be about two lines in diameter.

Dressing.—After the expiration of six or seven hours, the surgeon should remove the apparatus, and make a crucial incision through the black and humid eschar, which is then to be covered with a soft poultice, or weak basilicon ointment, spread upon a piece of buckskin or soft court-plaster. The poultice or plaster should be daily removed, until the eschar is completely detached, and when this has taken place, a dry pea, a ball of iris or of wax should be introduced into the centre of the ulcer, and removed about once a day. The pea is usually covered with a leaf of ivy or a piece of prepared paper, and the dressing is completed by the application of a compress and bandage.

In order to keep the pea in its proper place, a thin thread may be passed through it, the ends of which should be tied together, and directed towards the upper part of the wound, where they are to be secured by means of a small piece of adhesive plaster. Without this precaution, the pea is frequently displaced, and gradually ulcerates away the parts which are before it, while those which are behind begin to heal. In cases of this kind, the issue is sometimes removed to a considerable distance from the place which it originally occupied, an inconvenience which may be easily avoided by the means to which we have just alluded.

The bandage should be tied with sufficient firmness to prevent the formation of fungous granulations, which frequently render the issue extremely painful and unpleasant. If they are developed, however, notwithstanding this precaution, they must be carefully destroyed with the nitrate of silver, or the powder of burnt alum.

Operation with the bistoury.—The surgeon and his assistants are to pinch up a fold of the integuments, and with a lancet or bistoury, make a transverse incision of a few lines in length. A ball of lint is then to be introduced into the wound, and covered with a compress and bandage. In about three or four days, when the suppuration will have begun, the ball of lint is to be taken out, and a pea substituted in its place.

In some instances, when the patient objects to the knife or the caustic, an issue may be readily formed by raising the cuticle with a small blister, and covering the excoriated surface with a piece of linen spread with cerate, and having a hole in its centre sufficiently large to contain a pea. The pea should be secured by a piece of adhesive plaster, a compress and bandage. The pressure should be gradually augmented, and fresh peas put in, until the surgeon has obtained the desired effect.

MOXA.

The moxa is composed of soft substances prepared from the dried leaves of the *artemisia vulgaris*, hemp, agaric, lint, and various other bodies; but carded cotton is what operates with

most certainty, and is now almost invariably used for the purpose. Whatever may be the substance, however, that is employed, it should always be rolled up in such a manner as to form a very firm cone, which is to be enclosed by a piece of gauze or covered with a layer of a solution of gum arabic, which, in drying, forms a firm investment for it. The size of the cone should exactly correspond to the extent of the eschar intended to be made; its ordinary width being about one inch.

In applying the moxa, it should be held with a pair of dressing-forceps, with the instrument called the porte-moxa; or it may be introduced into an opening through the centre of a piece of pasteboard. One of the extremities of the cone is to be set on fire, and the other applied upon the skin: the combustion should be facilitated by means of a blow-pipe.

The moxa burns down with a temperate glowing heat, and produces a dry yellowish or black eschar, the separation of which is promoted by the application of simple cerate or basilicon ointment. The slough generally falls off between the twentieth and thirtieth day. In case the pain which results from the moxa, is severe, it will be proper to bathe the parts with the aqua ammoniæ, which appears to be the best application that can be employed for the purpose.

Some surgeons prefer the moxa made of the down of the leaves of the *artemisia vulgaris*, the pith of the trunk of the *heliantus annuus*, and of cotton or linen, boiled in a strong solution of the nitrate of potash; but most of these burn with too much rapidity, and produce only a superficial eschar. The pain which they occasion is certainly less severe than that which results from the use of carded cotton; but even this may justly be considered as an inconvenience in the eyes of the practitioner who employs the moxa, because he regards it as one of the most powerful therapeutic agents within his command. The severe sufferings which it occasions, will no doubt always induce the benevolent surgeon to avoid pain as much as possible, but when a remedy of this kind is positively indicated, its action should always be promoted in the most effectual manner. In the case before us, therefore, this maxim would be far more injurious than beneficial to the patient.

ACTUAL CAUTERY.

The body may be cauterized in two different ways, one of which consists, as we have already said, in the application of the moxa, or lighted charcoal; the other in the application of a heated iron, of hot water or oil, and various other substances.

Lighted charcoal should only be employed in case the surgeon is unable to procure a proper cauterizing instrument. In using it the coal is to be held with a pair of dressing-forceps, at the distance of from one to three inches from the surface of

the affected part, and a fresh one is to be taken as soon as the other becomes extinguished. Whenever it is practicable, however, we should by all means employ a heated iron. The instrument, which is generally used for this purpose, is called the cautery, and consists of a wooden handle, a piece of iron, slightly curved at its extremity, and of an iron or steel head. The head is made in various shapes, being either olivary, cone-like, annular or rounded, according to the circumstances of the case.

Choice of the cautery.—As the disposition of the parts which are intended to be cauterized, and the indications to be fulfilled are not always the same, it is a matter of no small importance to select a proper shaped cautery. The surgeon, therefore, in making choice of his instrument, should always conform to the rules which are to be observed in each particular case.

Thus, in cauterizing the parietes of a deep and narrow cavity, or a small deep seated surface, the surgeon should always employ the cylindrical cautery, which consists of a piece of iron, attached to a straight handle. When a very small extent of surface is to be cauterized, or when it is intended to enlarge an opening, the olivary or conical cautery, will generally answer the purpose. In case, however, the surgeon wishes to destroy the base of a pedunculous tumour, or to cauterize a large extent of surface, it will be necessary, in the former case, to employ a hatchet-shaped, and in the other, the nummulary cautery. Finally, in performing the syncipital cauterization, the operator should always make use of the annular cautery, which, though it acts upon a considerable portion of the scalp, is by no means so apt to cause inflammation of the meninges as the nummulary.

Application of the cautery.—The cauteries to be used being fixed upon, the surgeon separates them from their handles, and heats them in a chafingdish of burning charcoal. As soon as they have become properly heated, the handles are to be re-applied, and the cauterizing extremity is to be placed upon the parts. During this time, an assistant prepares another cautery, which is to be applied as soon as the preceding one becomes cool. After the operation is completed, care should be taken to plunge the cauteries into cold water, in order that they may be properly tempered.

As the effects which are intended to be produced by the application of the instrument, always differ according to the intensity of the heat, it is highly important that the surgeon should be able to regulate and distinguish this temperature. Both iron and steel, when heated, have the property of acquiring different shades which vary from gray to white; the former being indicative of the lowest, the latter of the highest degree of temperature. Besides these, there are several intermediate shades, such, for instance as a deep or bluish red.

It is well known that the irritation and pain which result

from the application of the cautery, are greater in proportion as the instrument is less heated. When it is designed, therefore, to disorganize a part by a slow and powerful irritation, the surgeon should always employ the gray or reddish-brown cautery, and in cases of an opposite character, the white.

The manner of applying the actual cautery, must always vary according to the effects which it is intended to produce. In case it is designed to produce a severe excitement, or even a superficial inflammation, the nummular cautery should be heated white, and held at some distance from the parts which are to be excited, taking care always to hold it nearer as the instrument becomes cool. This kind of cauterization forms what is called the objective mode. When it is intended to propagate the same effects to the parts which are more or less remote from the skin, and to prevent this organ from being too severely inflamed, the instrument should be carried rapidly over the parts, so as only to disorganize the superficial layer of the dermis: this constitutes what is called the transcurrent cauterization. Finally, when it is designed to convert a diseased surface into an eschar, and produce at the same time a deep seated irritation, the cautery should be heated white, and applied upon the parts with more or less firmness and for a longer or shorter period; and before it becomes cool, another should be applied. This constitutes what is technically termed the inherent cauterization.

When the operation is completed, the separation of the slough should be promoted by the application of fresh cerate, spread upon a piece of soft linen, and secured by a light bandage. When the eschar is detached, the ulcer should be dressed like a common suppurating wound.

ACUPUNCTURATION.

The operation of acupuncturation is performed by means of very slender, sharp-pointed needles, from two to four inches in length, and fastened at their upper end into a convenient handle. The best are made of steel, and should be rather soft and flexible. When these instruments, however, can not be obtained, the surgeon may generally accomplish his object with a common sewing needle, passed through a rounded piece of catheter, so as to form a head to the instrument. The needles which are made of gold, silver or platina, have the advantage that they do not become oxidized, and that they may be extracted with less pain; but, as it is impossible to make them as slender as the steel or iron needle, they are at present seldom used.

Operation.—In performing the operation of acupuncturation, the surgeon tightens the skin with the left hand, and holding the needle between the thumb and index-finger of the other, plunges the point of the instrument into the parts, ei-

ther in an oblique or perpendicular direction, according to the circumstances of the case, and carries it to a proper depth by a slight but continued pressure, aided by a rotatory motion. As soon as the needle has passed through the integuments, it will be necessary, in order to prevent it from being bent or broken, to support it with the thumb and index-finger of the left hand. In this manner, the instrument should be made to enter to a sufficient depth, which must vary according to the nature of the parts and the seat of the pain. As a general rule, it has been recommended never to pass the needle beyond the affected part, but rather to keep it on this side. In this case, the effect of the instrument is equally great and beneficial, while in the former it is sometimes productive of mischief.

Experience has shown that a needle may be introduced into some parts which contain large nerves or bloodvessels, or into some of the principal viscera, such as the lungs, the stomach, and the intestines, to the depth of several inches, without the least inconvenience. Care should be taken, however, not to let the instrument enter deeper than an inch, or an inch and a half, and to avoid the large joints and the course of the principal arteries and nerves; and if there be any occasion to introduce it into a deep seated organ, the operator should by all means make choice of a very flexible and slender needle.

The operation may be performed either upon the part affected, or in its immediate vicinity.

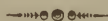
Under ordinary circumstances, the introduction of the needle occasions but little pain, and often none at all. In some instances, however, the pain is extremely severe, and the patient suffers so much as to faint. The symptoms which usually accompany it, are the appearance of a red areola around the puncture, pricking pain towards the point of the needle, slight chills, contraction of the muscles, partial or general sweats, and a diminution and sometimes an almost instantaneons disappearance of the disease.

The number of needles to be introduced must vary according to the extent of the affection, the sensibility of the patient, and a variety of other circumstances. The time also during which the instrument is to be left in the parts, must vary according to the nature and obstinacy of the disease, and according to the relief afforded immediately on the introduction. Thus, in cases of obstinate pain, where the results of the operation are at first rather unsatisfactory, the needle should be left in for six, seven, or even eight hours, while in those of an opposite nature, where the pain ceases almost instantaneously, it should be withdrawn in a few minutes. Under the most favourable circumstances, the needle should always remain in from thirty to sixty minutes, until the pain has completely subsided. In cases of a less favourable nature, however, it is sometimes necessary to keep it in for six, eight, twelve, or twenty-four hours. Under these circumstances, if the nature of the case is such as to demand a longer continuance of the remedy, the

instrument should by all means be withdrawn, and another introduced; because, if this precaution be neglected, the needle will soon become so rough and oxidized, that its extraction will be attended with much pain and difficulty.

Electro-puncturation is an operation precisely similar to acupuncture, with this exception, that here the introduction of the needle is only an accessory means intended to convey the electric fluid into the affected part. In performing the operation, the surgeon takes a needle, furnished with a small ring at its upper end, and introduces it into the parts in the same manner as in the preceding case. Through this ring is to be passed a conducting wire, which is to be attached to an electric battery, if it is intended to produce a shock, or to a galvanic pile, if the surgeon wishes to keep up a continued current. The last method, however, appears to be the most advantageous, and should, therefore, be generally preferred.

Dr. Andrieux, who has derived much benefit from the employment of galvanism in the treatment of diseases, has shown us an instrument of his invention, by means of which he has derived the most happy effects from the operation of electro-puncturation. With this instrument, which we shall not be able to describe on the present occasion, the author above-mentioned is able to introduce the needle, which is concealed in a very delicate canula, without inflicting the least pain upon the patient. It is possible also, without separating the needle, to give the instrument a proper direction, to pass it to a determinate depth, and to convey the fluid, which is transmitted from the galvanic pile, into the parts without the least loss.



CHAPTER III.

OF THE DISEASES COMMON TO THE DIFFERENT REGIONS OF
THE BODY.

General Observation on Inflammation.

Although irritation is generally regarded as the proximate cause of inflammation, yet it is not against it that the surgeon is to direct his therapeutic means, but against those physical changes which are produced in our organs, and which are usually characterized by pain, swelling, heat and redness. These means, in fact, can scarcely ever act upon the proximate cause of the inflammation itself, so that all that is necessary in the treatment of this affection, is to promote its natural ten-

dency towards the most favourable termination, either by removing the causes by which it is kept up, or by moderating the excessive action of the parts.

This irritation is either owing to an external cause, such as the action of a chemical or mechanical agent, or to a temporary accidental modification of the organs; a modification which is only appreciable by its effects, and which may, with great propriety, be called the internal cause.

Symptoms of inflammation.—Swelling.—The swelling of an inflamed part arises from an engorgement and dilatation of the capillary vessels; from the interruption of absorption, and from an effusion of the fibrinous part of the blood, which, in coagulating, deposits a portion of the serum into the surrounding cellular tissue.

Heat.—The real increase of temperature of an inflamed part, when judged of by the thermometer, is generally much less than might be reasonably inferred from the patient's sensations. It appears to be owing to a preternatural determination of blood in the vessels, and more especially to the rapidity of its circulation.

“The real increase of temperature is said never to exceed the heat of the blood at the heart. This in health is usually about 100 degrees of Fahrenheit's Thermometer, but in some diseases it arises to 106°, or even 107°. Mr. Hunter artificially excited inflammation in the chest of a dog, and in the abdomen, rectum, and vagina of an ass, without being able to discover any obvious rise of temperature in these parts. In a patient, however, on whom he operated for hydrocele, the thermometer introduced into the tunica vaginalis and kept for some time close to the side of the testicle, was only 92°, but rose the following day, when inflammation had come on, to 98 $\frac{3}{4}$ °.”—*S. Cooper's Surgical Dictionary.*

Redness.—The redness of an inflamed or irritated part, is evidently owing to a distention of the vessels, and to an increased quantity of blood. A greater quantity of red globules must necessarily be contained there, because the capillary vessels which previously contained this fluid, are preternaturally enlarged, so as to be capable of receiving a greater proportion of red blood than in the healthy state.

Pain.—The pain arises from the compression of the nerves, and from the distention and strangulation of the capillary vessels, in consequence of a preternatural determination of blood to the affected part.

Parts, which in the healthy state have little, or no sensibility, become exquisitely sensible in the inflamed. That this is the case with tendon, ligament, cartilage, bone, and membrane, seems to be fully established by Dr. Whytt, in the very instructive controversy carried on between him and Haller, respecting the sensibility and irritability of the different parts of man and other animals.—*Thomson's Lectures on Inflammation.*

From the preceding observations, it is evident, that the treatment of acute inflammation must be of such a nature as to re-

move the distention of the capillary vessels, by local or general bleeding, emollient applications, diluent drinks, rest, and low diet. By the employment of these means, the blood becomes more aqueous, the general circulation retarded, and the parts disorged and less painful.

Every inflammation terminates either in delitescence, resolution, induration, suppuration, or gangrene.

Delitescence.—Inflammation terminates in delitescence, when there is a sudden and complete cessation of all the symptoms by which it is characterized, before the disease has passed through its different stages.

Resolution.—Resolution is the slow and gradual subsidence of all the inflammatory symptoms, and the restoration of the parts to their natural condition, without any new pathological phenomena.

Induration.—This takes place when the inflammation leaves the tissues of the affected part in a hard and indolent condition.

Suppuration.—This termination generally takes place, when, notwithstanding the employment of the usual antiphlogistic remedies, the local and general symptoms, instead of diminishing, rather augment; and when the tumour gradually increases in size, becomes soft and prominent, and finally experiences a considerable abatement of pain, and acquires a clear shining appearance.

Gangrene.—This termination is the effect of the complete and permanent destruction of the life of the inflamed part. It arises from the enfeebled state of the arteries, the vitality of which is finally destroyed, so as to disable them to continue the circulation.

The terminations in delitescence and resolution, when they do not produce a metastatic inflammation in some other organ, are decidedly the most favourable. In the treatment of this disease, therefore, we should always endeavour to bring about these terminations as early as possible; for if this be neglected, it must inevitably terminate either in induration, suppuration, or gangrene. The same mode of treatment, however, is by no means applicable to every stage of the disease, but varies, as has been justly observed by a modern author, accordingly as the inflammation is incipient, or in its highest degree of violence.

GENERAL TREATMENT OF INFLAMMATION.

An external incipient inflammation, such as that, for example, which results from a sprain or burn, or from an idiopathic erysipelas, should always be treated in such a manner, as to enable it to terminate in delitescence or resolution. The same observation holds good in inflammations which arise from internal causes, such as those, for instance, which are developed in the testicle, the neighbourhood of the anus, as well as those which result from syphilitic buboes, whitlow, and a variety of other causes.

Delitescence may be induced by what is called the perturbing method of treatment, because it is of such a nature as to arrest the disease and produce a complete and sudden subsidence of the inflammatory symptoms. This method consists in retarding the circulation by means of general or local bleeding, in preventing a greater determination of blood to the affected part, and in removing that which has already taken place, by the application of discutient, resolvent, and sedative applications, or by a strong revulsive irritation at some distance from the inflamed part.

The means which are generally employed for this purpose, are cold, astringent and soothing applications; such, for instance, as cold water, ice, lead water, cimolian earth and vinegar, and the aqueous or oleaginous solution of opium, and decoctions of narcotic plants. It has also been recommended by some surgeons to make general and uniform pressure upon the affected part; but this means is seldom applicable and even frequently injurious. The perturbing method of treatment, which is so highly beneficial under the circumstances to which we have just alluded, should by no means be adopted in cases of idiopathic inflammations, or in any other, whatever may be its cause or nature, that has already acquired a considerable degree of intensity.

As the termination in resolution is generally the most favourable, the surgeon should always endeavour to bring it about not only during the incipient stage of the disease, but even after it has arrived at its highest degree of intensity. The method of treatment, applicable in this circumstance, must be such as to assist the salutary operations of nature, to arrest the progress of the inflammation, to dissipate slowly and by degrees the symptoms of the disease, and to restore the parts to their healthy condition. To accomplish this, recourse should always be had to the antiphlogistic method of treatment, which consists in a proper regimen, and in pharmaceutic and surgical means.

A.—Regimen.—The regimen of the patient has for its object the removal of every physical or moral cause that may have a tendency to produce hyper-irritation, and a diminution in the force of the circulation or in the vital energy of the whole system. Thus the patient, who suffers from an attack of inflammation, should be confined in a well ventilated and quiet apartment, where the temperature is perfectly mild and uniform; and should observe the most strict diet, especially if the affection be intense and occupies a considerable extent of surface; or make use of veal or chicken broths, weak gruel, and ripe fruit, if the inflammation is local and unaccompanied by any general symptoms of reaction. If the symptoms are severe, the patient should be confined to his bed, and the inflamed part should be gently elevated so as to prevent the distention of its capillary vessels, and facilitate the venous circulation. His bowels should be opened by injections or gentle laxatives,

and the cutaneous and urinary secretions, should be promoted by the use of mild sudorifics and diuretics. His mind should be kept perfectly tranquil, and if he be unable to sleep, recourse should be had to the cautious administration of anodyne remedies.

B.—Parnacheutic means.—The pharmaceutic means consist of cold and diluent drinks, of relaxing and emollient applications, of revulsives to the cutaneous or mucous surfaces, and of narcotic or anodyne remedies.

Cold and diluent drinks.—These consist chiefly of milk-whey, the different kinds of emulsions, the decoction of prunes, orgeat,* gum arabic water, gruel, marsh-mallow tea, and of veal or chicken broths. Of these the patient should be desired to drink freely, taking care always to prescribe them warm in the winter, and cold in the summer.

Relaxing and emollient applications.—The relaxing and emollient applications act immediately upon the affected part by their mild temperature, their moisture, and sometimes also by the peculiar properties of the substances which enter into their composition.—As there are several kinds of relaxing and emollient applications, we shall here speak of each in particular.

I.—Tepid fomentations.—These consist in covering the parts either with bladders of warm water or milk, or with flannels dipped into a decoction of mucilaginous plants, either alone or in combination with camphor, saffron, or other soothing ingredients. These applications are extremely useful, especially when they are made with warm flannel, which has the advantage that it may be kept continually moist, without uncovering the parts, by means of frequent imbibitions. Great care should be taken that these applications never incommode the parts by pressure, because, if this precaution be neglected, they will give rise to pain and irritation.

II.—Warm poultices.—Warm poultices are made by putting linseed meal, emollient plants, or some slices of bread crum, in milk or water, and letting them gently simmer over the fire in a sauce-pan, until they are properly softened. When this is done, the mass is to be mixed and stirred about with a spoon, and spread on linen, in order to be applied. These kinds of poultices are generally preferable to fomentations; they keep the parts warm and moist for a much longer time, and have the advantage that they may be put in contact with the most painful surfaces without producing any unpleasant or painful sensation.

III.—Local baths.—These, which may be either common or medicated, are used in inflammations of the superior and inferior extremities, and the internal and external inflammations of the abdomen and pelvis.

IV.—The general bath, taken either warm or cold, and continued for a considerable time.

* Orgeat is a drink made of water, sugar, and almonds.—S. D. G.

V.—The semicupium or hip-bath, taken in the same manner as the preceding.

VI.—The vapour-bath, applied to the inflamed part.

Revulsive applications.—Revulsive applications are indicated when the inflammation is so obstinate as not to yield readily to the preceding measures, and to discutient or anodyne applications. They should be employed in conjunction with the means to which we have just alluded, and should never be resorted to during the early stages of the disease. As they are intended to change the seat of the irritation, they should always, if the inflammation be primitive, be applied at some distance from the affected part; but, if it be metastatic, they should by all means be applied to the part originally affected. If it be intended to produce a sudden and efficacious revulsion, it will be necessary to have recourse to more or less energetic means. The most feeble, or those which act slowly, are dry or aromatic frictions, the issue and seton; the most energetic, hot water, the moxa, the application of the actual cautery, ammoniacal preparations, blisters, sinapisms, dry cups, and stimulating baths. All these revulsive applications act directly upon the skin.—The irritation of a local inflammation may also sometimes be removed by irritating the alimentary canal with purgative medicines, such as castor oil and the different neutral salts; but these revulsives are never indicated during the early stages of a slight acute inflammation.

Narcotic and anodyne remedies.—Narcotic and anodyne remedies are extremely useful when the inflammation is so severe as to resist the usual antiphlogistic measures, and the pain is so exquisite as to produce obstinate and distressing insomnolency. To fulfil this two-fold indication, the surgeon should apply warm cloths, rung out of a decoction of saffron, poppy-heads, or hyoscyamus; and prescribe camphorated julep, small doses of lactucarium, or the extract of hyoscyamus or opium. This last remedy should be administered with particular caution, because it accelerates the circulation and is apt to augment the inflammation; and, when taken in too large a dose, it stupifies the organs and produces gangrene.

C.—Surgical means.—These consist in the application of cups, blisters, the actual or potential cautery, the moxa, dry frictions, sinapisms, and more especially in the use of blood-letting, which may justly be regarded as the best antiphlogistic means we possess. Amongst these means may also be included the scarifications or incisions, which the surgeon is sometimes obliged to make in the affected part.

General bleeding.—The bleeding should either be general or local. General bleeding in fact is indispensably necessary when the inflammation is very severe and extensive, or is developed in young, strong, and plethoric subjects. In cases of gangrenous inflammation, however, it should be carefully avoided, as well as in old and debilitated individuals. The most favourable period for the abstraction of blood, is the commence-

ment of the disease. The quantity of blood and the repetition of the operation must always vary according to the general state of the patient, the intensity of the inflammation and the importance of the affected organ. If the intention be to produce a sudden and deep impression upon the system and to diminish the mass of fluids, the surgeon should make a large orifice, and remove from nine to fifteen ounces of blood, according to the circumstances of the case; and, if he wishes at the same time to produce a revulsive effect, he should perform the operation at some distance from the seat of the affection.

Local bleeding.—Local bleeding, which consists in the application of leeches or cups, should never be performed upon the inflamed part, especially when the inflammation is in its incipient stage; on the contrary, it should always be performed in the neighbourhood of the affected part and upon the healthy tissues. If this precaution be neglected, there will be great danger of producing a new irritation, in consequence of the bite of the leech or the puncture of the lancet, though it should be remarked that this irritation may, in some measure, be prevented or rendered less dangerous by a copious local depletion.

Topical, like general bleeding, not only produces a diminution of the mass of blood, and a disgorgement of the vessels of the affected part, but it also creates a beneficial local irritation. The surgeon, therefore, should always apply his leeches or make his scarifications in the neighbourhood of the seat of the inflammation, or upon those parts which have a sympathetic connexion with the affected part. Local bleedings produce but little debility, and have the advantage that they may be frequently repeated; in some diseases, however, such as erysipelas, furunculus, compound fractures, and strangulations of the soft parts, venesection should always be preferred,

We have already had occasion to observe, that the division of the soft parts, as a means of combating inflammation, is sometimes one of the most powerful auxiliaries that can be resorted to, especially in cases of whitlow and anthrax. It removes the strangulation of the inflamed part, promotes the development of the tumified tissues, and produces a salutary discharge of blood. Incisions are not only frequently made in the diseases to which we have just alluded, but likewise in cases of inflammatory strangulations of herniæ, in gun-shot wounds of the extremities, where the ball penetrates to a considerable depth, and in all cases where the inflamed parts are bound down by aponeurotic fasciæ.

When the inflammation has terminated, or is about to do so, the surgeon will be obliged to change his mode of treatment, and resort to other measures than those which we have just pointed out.

When resolution takes place slowly and with some degree of difficulty, recourse should be had to gently stimulating applications, with the view of exciting absorption of the accumulated fluids. For this purpose the surgeon should apply lead,

poultices, and fomentations of elder water, either alone or in combination with some aromatic infusion, rendered strong by the addition of wine or alcohol: or if the affected part be a gland, it should be covered with the diachylon, soap, or cicuta plaster. The action of these applications should be aided by laxative drinks, or the employment of purgatives, such as calomel, or Belloste's pills.*

By these means, we may frequently succeed in preventing the termination in induration; but when this takes place, we should endeavour to restore the parts again, to their natural condition. In some instances, the induration, which may generally be regarded as resulting from chronic inflammation, yields to the employment of a very long continued antiphlogistic treatment, especially to the frequent application of leeches and cups, or to the use of scarifications. In other cases, however, it only disappears under the influence of discutient plasters, ammoniacal embrocations, and the application of electricity or galvanism.

The terminations in suppuration and gangrene require each a different and complicated method of treatment, which will be pointed out in speaking of abscesses and gangrene.

ABSCESSSES.

Subcutaneous Phlegmonous Abscesses.

General rules.—In general, we should never wait for the spontaneous opening of a phlegmonous abscess; on the contrary, we should always open it as soon as there are the least evident symptoms of fluctuation. By observing this rule, the pain and other inflammatory symptoms almost immediately subside, and the surgeon is enabled to prevent the attenuation and disorganization of the skin, and, consequently, a very slow cicatrization, and a disagreeable scar. Many practitioners, however, pursue quite a different course, when the abscess is seated amongst the lymphatic ganglia, or upon very conspicuous parts, such, for example, as the face, neck, and breast; but, instead of avoiding the inconveniences to which we have just alluded, they inevitably produce them. It will be better, even in these cases, to discharge the matter at an early period, than to wait until the fluid has accumulated in greater quantity.

Inconveniences from deferring the opening of an Abscess.—Although in some cases there results no inconvenience from a delay in the evacuation of the matter, yet in others, it is attended with considerable danger, especially; 1st, When the

* These pills are composed of mercury, powdered sugar, scammony, jalap, and white wine.—S. D. G.

pain is extremely severe, and does not yield to the common antiphlogistic, and soothing measures, as in cases of whitlow; 2dly, when the abscess is seated beneath very dense and aponeurotic investments, as those of the cranium, the palm of the hand, and sole of the foot; 3dly, when the matter is lodged amongst very lax cellular tissue, as in the axilla, and around the anus; 4thly, when it is developed in the neighbourhood of the large tendons or bones, so as to be able to produce a denudation, and exfoliation; 5thly, when it impedes the exercise of some important function, as when the abscess is seated in the fauces, the pharynx, or the neck; and lastly, when it is situated in the neighbourhood of a large cavity or joint, and there is danger that it will discharge itself into it.

Mode of opening a phlegmonous abscess.—The opening of a phlegmonous abscess is generally effected by means of a cutting instrument. Petit, of Lyons, however, has recommended, in order to prevent the consecutive suppuration, and produce an almost immediate adhesion of the parietes of the parts, to plunge a hot stylet into the centre of the abscess, and extract the purulent matter by means of a cup applied over the small wound.

In opening an abscess, the surgeon should always take care to plunge his instrument into the most prominent and dependent part of the tumour, and to proportion the extent of the incision to the quantity of the fluid, and the depth at which it is situated. The incision should generally be parallel to the axis of the body, and its length, whatever may be the size of the abscess, should never be more than fifteen or sixteen lines. In some instances, however, the surgeon will be obliged to hold his instrument in a transverse or oblique direction.

In order to avoid pain, the incision should be made by a single stroke of the knife, from without inwards, or from within outwards. When the parts which are to be divided, are thin and the tumour very prominent, the latter method should generally be preferred, more especially since it is more expeditious and less painful. If the opening be so small as to prevent the ready egress of the fluid, it should by all means be enlarged by extending the incision. In case it is necessary to make one or more secondary openings, the first should be closed with a dossil of lint, in order to retain the matter, or the surgeon may introduce one or two fingers into the abscess, or a grooved director, so as to extend the parts in the direction in which the new incision is to be made.

The instrument which is commonly used for opening phlegmonous abscesses, is a straight sharp-pointed bistoury. The position in which it is to be held, has already been pointed out in speaking of the different kinds of incisions.

When the abscess is properly opened, the pus will flow with facility, though it will be necessary to favour its discharge by a slight degree of pressure upon its parietes. When a suffi-

cient quantity of matter has been evacuated, the edges of the wound should be kept open by means of a small piece of lint, and be covered with a soft emollient poultice. These dressings should be continued for two or three days; after which it will be sufficient to apply a few pledgets of lint, either dry or spread with simple cerate, and a proper bandage. Sometimes, however, it will be necessary, in order to facilitate the discharge of the matter, to introduce a dossil of lint or a piece of raveled linen; but this precaution will be perfectly useless when the opening is properly situated and sufficiently large.

If the matter is unable to flow with facility, on account of the narrowness or unfavourable situation of the wound, or if it forms a fistula, or remains for a long time in the cavity of the abscess, it will be necessary to remedy the evil as speedily as possible. For this purpose, it will sometimes be sufficient to place the parts in a dependent posture, to enlarge the incision, or to divide the fistulous track throughout its whole extent, to apply gentle pressure, or make use of stimulating injections. In some instances, also, it will be necessary to make new openings to evacuate the matter, to introduce a seton, &c.—*See Compression under the head of Purulent Abscesses.*

To these general rules, which are applicable to most phlegmonous abscesses, may be added the following, which vary according to the seat of the affection.

Abscesses between the vault of the cranium and dura mater.—The abscesses which are developed between the vault of the cranium and dura mater, or in the cavity of the arachnoid membrane, and perforate the bones, require the enlargement of the fistula by means of the operation of trephining.—*See Diseases of the Head.*

Abscesses under the mastoid process.—Abscesses under the mastoid process of the temporal bone, should be opened as speedily as possible, whether they do or do not result from a caries of the bone; for if this be neglected, there will be danger of a consecutive alteration of this process, if it do not already exist, or of a habitual discharge of purulent matter through the meatus auditorius externus.

When this last circumstance takes place, the surgeon should endeavour to prevent the discharge by drying up the source of the pus. To effect this, the auditory passage should be plugged with dossils of lint, so as to oblige the fluid to collect in the abscess in sufficient quantity to form a tumour under the integuments; and when this is sufficiently apparent, it should be opened by an incision, which, by enabling the matter to escape, prevents its oozing through the ear, excites adhesion between its parietes, and gradually produces a complete obliteration of its cavity.

Abscesses of the eye-lids.—The abscesses of the eye-lids, which often arise in consequence of erysipelas of the face, require to be opened at an early period by means of a horizontal incision with the lancet. This precaution is indispensably

necessary in order that the cicatrice, which will be parallel with the fold of the skin of the eye-lid, may be concealed.

Abscesses of the face.—Abscesses of the different regions of the face should likewise be opened at an early period, especially those of the cheeks, whether they do or do not depend upon a carious condition of the teeth. If this precaution be neglected, there will be great danger of producing an obstinate fistulous opening. In order to avoid the deformity, we should always, if possible, make the opening of the abscess through the mouth.

Abscesses in the tonsils or pharynx.—In opening abscesses in the tonsils or pharynx, the surgeon should either use the pharyngotomus, or a long and slender bistoury, the blade of which should be covered with a strip of linen from its heel to within a few lines of its point. In order to make the necessary incision, the patient should be placed in the same posture, and the instrument held in the same manner, as in the extirpation of the tonsils.

Abscesses of the parotid gland.—As regards abscesses of the parotid gland, it will generally be better to open them with caustic potash, more especially when they are of a critical nature.

Abscesses of the maxillary sinus.—Of the treatment of these, we shall have occasion to speak in the article on ozæna.

Abscesses of the neck.—Abscesses of the neck are treated precisely on the same principles as the preceding. Care should be taken to open them as early as possible if they have the least tendency to extend towards the inferior part of the cervical region; because, if this be neglected, there will be great danger of their bursting into the anterior mediastinum.

Abscesses of the chest.—The collections of purulent matter in the internal or external parts of the thorax, which demand the employment of essentially surgical means, are: 1st, Those which are developed in the substance of the parietes of that cavity; 2dly, Those which are seated in the cellular tissue which connects the pleura to the ribs; and 3dly, Those which arise in consequence of empyema, and result from the perforation of the pleura and a collection of matter below the integument, which communicate with the cavity of the thorax. We have already said that in abscesses of the mammæ we should not wait for a spontaneous opening, but open them as speedily as possible.

Abscesses in the abdominal parietes.—Abscesses in the abdominal parietes do not require any particular attention, except that, in order to prevent them from bursting into the cavity of the peritoneum, we should endeavour to evacuate them as soon as possible, by making an incision parallel to the fibres of the muscles of the abdomen.

The abscesses which supervene in consequence of inflammation of the liver, the spleen, kidneys, and some other organs, are to be opened only when they become prominent on

the surface of the body, and present evident symptoms of fluctuation, together with a redness and protrusion of the skin, and demonstrate that the tumour is merely covered by that membrane and has contracted adhesion with the adjacent parts.

Abscesses of the vulva.—In abscesses of the vulva, the surgeon should never wait for the complete accumulation of the matter, because the laxity of the cellular tissue of the labia pudendi is so great as to enable the fluid to become extensively infiltrated, and burrow amongst the parts, so as to be sometimes discharged with great difficulty unless we make new incisions. When such an abscess is opened spontaneously, it has been generally recommended to enlarge the opening at the most dependent part of the tumour, in order to avoid the accident to which we have just alluded:

COLD OR CHRONIC ABSCESSSES.

A.—*Cold Idiopathic Abscesses.*

When these kinds of abscesses are formed without any previous distention of the cellular tissue, they should be opened as soon as there are any evident symptoms of fluctuation. When, however, they have been preceded and are accompanied by swelling and induration of the subcutaneous cellular tissue or the adjacent lymphatic ganglia, the parts should be gently stimulated, in order to promote the suppurative process. For this purpose, they should be covered with stimulating plasters, such as the plaster of diachylon or ammonia, or, what is still better, they may be excited by the application of the moxa or blisters, according to the extent and hardness of the engorgement, and the degree of excitability of the tissues.

When a cold idiopathic abscess has arrived at its maturity, it should never be abandoned to the operations of nature, because it will require a long time for its spontaneous opening, and by waiting, a considerable collection of pus will inevitably take place and produce a large cavity in the soft parts, in consequence of the destruction of the cellular tissue.

From these observations, it is evident, that the cold idiopathic, like the phlegmonous abscess, should be opened as soon as possible, either by a large incision with caustic potash, a seton, or the repeated introduction of the lancet; means which are calculated to produce adhesive inflammation between the parietes of the abscess, and a complete obliteration of its cavity.

The opening of an abscess by means of caustic has been particularly recommended when the tumour is of a small size. To accomplish this, the surgeon should proceed in the same manner as in the operation for making an issue, with the exception, however, that the opening in the plaster should be oblong, and proportioned to the size of the tumour, and that,

instead of one piece of caustic potash, it will be necessary to apply several, in order to form what is called a drain.

Four or five hours after the application of the caustic, the apparatus should be removed; and if the opening is not completed or is too small, the matter should be immediately discharged, by making an incision through the semi-fluid eschar. This measure is absolutely necessary when the abscess is large and the surgeon has reason to apprehend that it will continue to progress: in cases of an opposite character, however, this may be neglected, and the surgeon wait until the eschar has sloughed.

After the matter has been evacuated, the parts should be dressed in the same manner as in cases of phlegmonous abscess.—*See page 65.*

Large abscesses in the back and loins, and the top of the shoulders and the upper part of the thighs, should always be opened with the knife. To effect this, the surgeon being armed with a straight bistoury, makes several punctures at short intervals in the most dependent part of the tumour, and discharges each time a portion of the fluid, in such a manner as to enable the parietes of the abscess gradually to approximate. After each puncture, care should be taken to close the wound, by keeping its edges in contact by means of strips of diachylon plaster. When the surgeon perceives, that, by means of this treatment, the discharge gradually diminishes, and the tumour becomes smaller, he should endeavour to produce inflammation of the parts, by making a large opening with the bistoury or the caustic potash.

In cold abscesses of the knee-joint, the late Mr. B. Bell, of Edinburgh, was in the habit of opening the tumour by a double incision, and of carrying a seton across the wound, in order to promote the discharge of the matter and produce the obliteration of the cavity of the abscess.

An opening sufficiently large for the cord, being made with a lancet in the superior part of the abscess, a director, slightly curved, and having an eye at one end, threaded with a cord of candle-wick cotton, or soft silk, proportioned in thickness to the size of the tumour, is then to be introduced, and its point to be pushed downwards until it is felt externally, exactly opposite to the most depending part of the swelling.

The director being kept firm by an assistant, an incision is to be made with a scalpel upon its lower end, somewhat larger than the opening first made. The director is now to be withdrawn downwards, with so much of the cord as will leave two or three inches of it hanging out of the lower orifice. In about twenty-four hours after the introduction of the cord, and daily afterwards, so much of it should be drawn downwards as will admit of all that part of it being cut off which had been lodged in the abscess. In order to make the cord pass easily, the part to be used should always be rubbed with some emollient ointment.

By this method of cure, the gradual discharge produced, admits a gradual contraction of the sides of the cavity, and the slight inflammation supported on their surfaces, by the irritation of the cord, induces a firm and speedy union of them. As the discharge diminishes, the seton should be lessened by degrees, by withdrawing a thread of the cotton once in two or three days. At

length, when little more matter is produced than may be supposed to arise from the irritation of the cord, it may be altogether taken out, and a gentle pressure should then be made on the parts by a roller, until the completion of the cure.—See *B. Bell's Surgery*.

B.—COLD CONSTITUTIONAL ABSCESSSES.

Cold constitutional abscesses are those which appear to be owing to a scrofulous taint of the system. The treatment is precisely similar to that of cold idiopathic abscesses, only that it will be necessary in these cases to remove the cause of the affection by an appropriate course of internal remedies. The abscess should be opened as soon as there are any evident symptoms of fluctuation, by means of the caustic potash.

C.—ABSCESSSES FROM CONGESTION.

An abscess from congestion differs from the preceding inasmuch as it is formed at a greater or less distance from the seat of the disease upon which it depends. It is not only developed without symptoms of inflammation in the place which it occupies, but it is nothing else than a bag filled with purulent matter, and not an abscess whose parietes give rise to the secretion of this fluid. It generally results from an alteration of the bones, and more particularly from the articular extremities of the long ones, and from those of the vertebræ.—For the treatment of this disease, see the articles on caries of the vertebræ, gibbosity and coxalgia.

EXTERNAL GANGRENE.

External gangrene is the complete and permanent cessation of the phenomena of life in the soft parts. Gangrene is not, therefore, properly speaking, a disease; for the idea of disease must necessarily imply that there is life in the affected part, and, in most cases, the possibility of the return of the organ to its normal condition. When there is a total extinction, however, of the vital phenomena, there must necessarily be a decomposition of the tissues, and a want of power in therapeutic agents to restore the disorganized parts to their former integrity.

Gangrene is no more a local disease, than general death is a disease of the whole system. If by this term, therefore, be understood the assemblage of phenomena which is presented by one or more organs that are deprived of life, in consequence of disease, we shall be led to the conclusion that there is no special treatment for the cure of gangrene.

This in fact is the case. What authors are in the habit of calling the treatment of gangrene, is nothing else than a series of means calculated to prevent its development; means which differ according to the nature of the affection and which rather

form a part of its treatment than of that of the mortification itself.

Little need be said of this preservative treatment, because it will naturally be spoken of in the observations of the diseases which terminate in mortification. Supposing, however, that gangrene is developed, and that, for the sake of complying with received usages, it is regarded as a particular affection, we shall endeavour to point out the means which are to be employed for the purpose of fulfilling the indications which it presents.

These indications consist in enfeebling or destroying the cause of the local or general affection which gives rise to the gangrene, or this disease itself; in modifying the pathological condition of the adjacent parts, so as to protect them from the disorganization; and in preventing the dangerous influence which the dead parts may exert upon the system, by their smell, their appearance and weight, and by the deleterious properties of the putrefied fluids which they contain.

As gangrene, whatever may be its cause, or the appearance under which it is presented, is most frequently preceded, accompanied, or followed by phenomena of local or general inflammation, or by adynamic symptoms, it is necessary that it should be combated chiefly by antiphlogistic or stimulating remedies. For this reason, therefore, we may arrange the different kinds of gangrene, considered with respect to their appropriate treatment, into two classes, viz: gangrene from inflammation, accompanied either by local or general inflammatory symptoms, and gangrene from local debility, accompanied with symptoms of prostration of the system.

There are few species of gangrene which do not result from local inflammation, or which are not accompanied or preceded by some inflammatory symptoms, even those which arise in consequence of the absorption of poison. The antiphlogistic method of treatment, therefore, is more frequently indicated than is generally supposed by practitioners, who are in the habit of using the actual cautery, of making deep incisions, and of applying irritating applications.

Amongst these species of gangrene, may be included those which result from intense inflammation; from the interruption of the arterial or nervous influence, in consequence of the rupture or compression of the principal arteries or nerves; from obstruction of the circulation in the capillary vessels; from the effects of cold, burns, or the application of caustics; those which result from the use of the *secale cornutum*; and even the gangrene of old people.

There are some species of gangrene, however, which do not exhibit the least symptom of inflammation, either general or local; as well as some which having been preceded by inflammation, are almost immediately accompanied by typhoid fever, with more or less prostration of the vital powers. These species of gangrene are ordinarily owing to the action of a

general debilitating cause, and imperiously demand the exhibition of tonics, and the application of such irritants as have a tendency even to disorganize the adjacent parts which are yet endowed with life, and which are in immediate contact with the mortified parts. Amongst these species of gangrene, may be included those which arise from the malignant pustule, carbuncle, pestilential buboes; as well as those which result from the presence of poison in the system, the use of the secale cornutum, the contact of putrid food, or the flesh of animals that have perished in consequence of carbuncle; and the different species of gangrene which attack the internal parts of the mouth or the genital organs of infants.

In the treatment of every variety of gangrene, the first thing to be done is to endeavour to ascertain to which of these two classes it belongs. This can be done rather by a careful examination of the parts, or of the general disposition of the system, or the effects of the medicines that were first employed, than by an examination of the nature of the cause of the disease. Should that species of gangrene, for example, which attacks the inferior extremities of old people, and which for this reason is called *gangrena senilis*, be treated indifferently by local or general stimulants before it has been carefully examined? Undoubtedly not: for there are sometimes cases, (a very remarkable one of which we have seen at the Hôtel-Dieu in Paris,) in which the ordinary treatment of gangrene by the exhibition of quinine and topical irritants, appeared to increase the symptoms and accelerate the progress of the disease, while the most happy effects were derived from the employment of the antiphlogistic method of treatment, especially from the use of blood-letting. We shall revert to this subject, however, in the following paragraphs, and in several other parts of the work, when speaking of some of the particular gangrenous affections.

GANGRENE FROM EXCESSIVE INFLAMMATION.

The means which are calculated to arrest this species of gangrene, like those of almost every other disease, may be arranged into two series, and constitute its local and general treatment, which are to be simultaneously employed.

General treatment.—The general treatment consists in moderating the action of the sanguineous system, in order to allay the inflammation and prevent the extension of the gangrene. For this purpose, recourse should be had to antiphlogistic measures, the choice of which must be regulated by the intensity of the symptoms and general state of the patient. The most important symptoms which prove the existence of the inflammation, are drawn from the state of the pulse and the appearance of the parts adjacent to the gangrene. If the pulse is frequent, full, and hard, if the skin is hot and dry, the

face red and animated, if, more especially, the adjacent parts are renitent, and exhibit a great degree of redness which disappears under the pressure of the finger, and reappears immediately after, we may, without hesitation, have recourse to dieting, to the use of diluent drinks and even blood-letting. Venesection, however, should always be practised with circumspection and discernment; for it is extremely useful when the general symptoms of excitement are severe, while it may be highly dangerous, even in cases of gangrene resulting from inflammation, if, instead of having recourse to it in the beginning, it is deferred until the inflammatory condition of the parts has subsided. It should not be forgotten, also, that this stage of reaction rapidly disappears, and that in the one which follows the indications are no longer the same.

It is necessary to examine carefully the condition of the *primæ viæ*, and, if they present symptoms of irritation, they should be remedied by the means to which we have just alluded. If, on the contrary, there be gastric or intestinal ingesta, without symptoms of phlegmasia of the stomach or intestines, recourse should by all means be had to the cautious administration of emetics or purgatives. These medicines, if properly employed, are frequently attended with the most decided advantage.

When the affected part is, as frequently happens, extremely painful, much benefit may be derived from the employment of opiates towards the latter part of the inflammatory stage, but never before. Finally, it may here be stated, as a general rule, that a severe and protracted regimen will often have a dangerous influence, inasmuch as it has a tendency to diminish the powers of the system, which, in gangrenous affections, and even in those which are accompanied with inflammation, are always apt to become depressed, and sometimes to sink in a very sudden and frightful manner. The regimen, therefore, should by no means be too debilitating; and as the inflammatory symptoms subside, care should be taken to substitute a tonic restorative diet, consisting more especially in the employment of nutritive vegetable substances, in addition to wine and animal food, as soon as the gangrene commences, or as soon as there are any symptoms of severe prostration.

Local treatment.—The local, like the general treatment, has for its object the removal of the inflammation of the parts, and the prevention of the extension of the gangrene: it is also designed to remedy the local effects of the mortification.

The first thing to be done, is to remove the local cause of the gangrene, whether it be owing to the pressure of a tight bandage, to a displaced bone, or to the presence of foreign bodies, such as extravasated fluids, chemical agents, or any other substances. When this has been effected, the surgeon should endeavour to lower the exalted action of the parts, by means of emollient and sedative poultices, and with fomentations of milk, as has been recommended by Mr. Pott, or the vapour

bath. When the inflammation is less intense, however, we may, instead of these means, have recourse to the application of compresses dipped in tepid lead water; and if the pain be so extremely severe, as to completely resist the antiphlogistic method of treatment, much advantage may be derived from the exhibition of opium. Let it be borne in mind, however, by the practitioner, always to abstain from the employment of what are called stimulating antiseptic applications, such as the *oleum terebinthinæ* and the other resinous substances, as well as the balsams, the different kinds of aromatics, the essential oils, alcoholic liquors, and the sulphate of quinine. These means, although they may be beneficial in some instances, are generally highly injurious in the cases before us.

When the first indication has been fulfilled, and the progress of the gangrene has been arrested, we should endeavour to prevent the dangerous effects which may result to the rest of the system from the pressure of the mortified part and the putrid decomposition.

The surgeon may be certain that the gangrene is arrested, when the parts are covered with brownish phlyctenæ, and when, instead of a slightly livid or yellowish circle, the eschar is surrounded by a very red, and moderately tense and painful inflammatory line, accompanied by a slight degree of heat. His diagnosis will also be greatly aided by a circular ulceration, which gives rise to the discharge of laudable pus and to a separation of the dead from the living parts. Under these circumstances, if the inflammatory condition of the healthy parts be still severe, it will be necessary, until its intensity has diminished, to continue the employment of the same means, taking care, however, to modify them according to the state of the case. If, on the contrary, the absence of pain, and the paleness and œdematous swelling indicate that the parts are suffering from a want of action, recourse should by all means be had to the treatment which will be presently pointed out. With regard to the gangrenous tissues, it will be necessary to act immediately upon them, not in fact with the hope of preserving them, but with the intention of removing them as speedily as possible from the healthy parts, and to prevent the dangerous symptoms which they are apt to produce when their removal is too long delayed.

We should endeavour, therefore, 1st, to retard their putrefaction by means of absorbent powders, that have a tendency to dry up the putrid fluids; 2dly, to disguise their nauseous odour, by covering them with very strong aromatic substances; and 3dly, to destroy the fetid miasmatic exhalations, as well as their deleterious properties, by such chemical preparations as have the property of combining with them, as for instance, the different kinds of vegetable and mineral acids, alcohol, and more especially the chlorites of soda and lime. Of these different substances, however, those only should be selected, which are

not very irritating; such, for instance, as powdered charcoal, or bark, and the chlorite of soda.

When the fœtor is extremely disagreeable, and the dead parts are long in becoming detached, much benefit may also be derived from the cataplasma cerevisiæ, and the cataplasma effervescence, as recommended by Mr. Cooper.

The cataplasma cerevisiæ, according to this distinguished writer, is prepared by stirring into the grounds of strong beer as much oatmeal as will make the mass of a proper thickness.

The cataplasma effervescence is made by mixing as much oatmeal with an infusion of malt, as will render the substance of a proper consistence, and then adding about a spoonful of yeast.

The charcoal poultice is made by mixing about two ounces of finely levigated wood-charcoal, with half a pound of the common linseed poultice.

During the separation of the slough, it will be necessary to pay particular attention, not only to the gangrenous parts, but also to the general state of the patient, and to endeavour, if there be any constitutional irritation, to remove it and to support the powers of the system by proper food and tonic medicines, especially when the slough is large, in order that the parts may be enabled to suppurate. Finally, after the complete removal of the gangrenous tissues, the denuded surface should be treated like a common suppurating wound.

GANGRENE FROM INTERNAL CAUSES.

As the means which we have pointed out in the preceding section, are useful in cases of gangrene resulting from inflammation from external causes, so are they injurious in the following circumstances: 1st, When the gangrene comes on suddenly and is unaccompanied by general or local inflammatory symptoms, as in the malignant pustule; 2ndly, When it has suddenly supervened in consequence of what is called a malignant inflammation, which may be attributed to the action of a deleterious principle in the system, as in cases of carbuncle, and gangrenous buboes; 3rdly, When, after symptoms of severe inflammation, there is a sudden abatement or complete cessation of the fever, with symptoms of great prostration, feebleness and intermittence of the pulse, coldness of the skin, paleness of the countenance, subsultus tendinum, and hiccough; and lastly, When, after the development of some of the preceding symptoms, the parts present a soft œdematous appearance, and a livid colour which does not disappear under the pressure of the fingers, or which becomes somewhat pale, but recovers slowly its former degree of intensity.

General treatment.—At the same time that the surgeon endeavours to remove the cause of the gangrene, he should by all means raise the strength of the patient, in order to enable the system to form a line of demarcation around the parts, and promote the separation of the slough. The means which are

best calculated to fulfil this indication, are stimulating drinks, such as sage or balm tea, infusions of bark, vinous lemonade, and a nutritious and easily digestible diet, such as the different kinds of feculæ, chicken broths, and calves-foot jelly. Towards the latter stages of the disease, the patient should be permitted to drink Alacant, Madeira, or Malaga wine, according to the circumstances of the case; and when the symptoms are very severe, we should prescribe preparations of ammonia, camphor, ether, and the different aromatic tinctures. The medicine, however, which has been most extolled in the treatment of gangrene, and which has generally been preferred, is the Peruvian bark; but its use is always contra-indicated when there are symptoms of continued febrile reaction or signs of gastro-intestinal inflammation. In some instances considerable benefit may also be derived from the exhibition of the sulphuric acid, in a little sugar and water, or from other kinds of acidulated drinks. When the bark produces diarrhœa, and the parts are extremely painful, it should be administered in combination with opium, of which three or four grains may be given during the twenty-four hours. This medicine, however, should be given in small doses, and its effects should be carefully watched, in order to suspend its employment, if it give rise, as it is sometimes apt to do, to unpleasant cerebral symptoms. Mr. Pott, who has extolled it highly in the treatment of dry gangrene of the inferior extremities, regards it as one of the most useful means that can possibly be resorted to in cases where the bark is injurious.

Instead of the bark, most practitioners are now in the habit of employing the sulphate of quinine. This medicine has not only the advantage of acting more speedily upon the system, but it is more easily retained on the stomach, and should therefore always be preferred. It may be given in doses of from one to two grains, every two or three hours, either in the form of pills, or an emulsion.

Local treatment.—If the cause of the gangrene obstinately persists and is of such a nature as to be attacked, it should be speedily destroyed. When this has been done, the surgeon should endeavour, by means of tonic, stimulant, and caustic applications, to modify the state of the parts which surround the dead tissues, in such a manner that the morbid process, by which the tendency to mortification is continually kept up, may produce a favourable change in the inflammation, so as to be capable of arresting the progress of the gangrene and of eliminating the parts which are deprived of life.

Amongst the useful topical applications that may be employed for this purpose, are, 1st, The powdered bark, which may be sprinkled upon the parts, or applied in the form of a poultice; 2ndly, The decoction of bark; 3rdly, The different aromatic tinctures, as that of myrrh, for example; and lastly, camphorated alcohol, which may be used either in the form of a

wash, or by dipping pieces of lint in it and applying them to the parts.

In order to promote the separation of the slough in the deep seated kinds of gangrene, surgeons have recommended covering the parts with the oil of turpentine or some of the resinous ointments. In some cases, it may also be necessary to apply pledgets of lint, dipped in equal proportions of a mixture of the unguentum resinæ and very hot oil of turpentine, and to cover these applications with emollient poultices; but if they create too much pain, they should be speedily removed, and emollient and anodyne applications applied in their stead. In some circumstances, as in cases of carbuncle, for instance, surgeons frequently resort to solutions of caustic; such as the nitrate of mercury, hydro-chloric, and nitric acid, which are far preferable to the actual cautery.

In order to promote the action of these caustics, it is sometimes indispensably necessary to make incisions through the disorganized parts, more especially when the disease is owing to an internal cause, and has a tendency continually to increase. Its progress may frequently be arrested by extending the incisions as far as the healthy tissues, and then cauterizing them.

When there are gaseous infiltrations, or a strangulation of the parts in consequence of an aponeurotic investment, or a collection of pus or putrid fluids, essential benefit may be derived from the use of scarifications. In these cases the incisions should be quite large, but care should be taken not to injure the healthy parts. As gangrenous eschars always act like foreign bodies, the surgeon should endeavour to remove them as fast as they become detached. At each dressing, therefore, they should be gently raised with a pair of dressing-forceps and cut off, taking care not to interfere with those that still adhere firmly to the adjacent parts. For, when this precaution is neglected, there will be great danger of injuring the patient and of aggravating the disease. In these cases, the suppuration should be promoted by covering the parts with pledgets of lint, smeared with a small quantity of the unguentum styracis, or any other digestive ointment. In all cases, as soon as the slough is detached, the parts should be treated like a common suppurating wound.

Notwithstanding what we have already said concerning the local treatment of gangrene, it will sometimes be necessary to adopt a diametrically opposite course, and, instead of promoting the separation of the slough, to retard it as much as possible. This is to be done, more especially, when there are one or more large arteries embedded in the slough, and there is reason to apprehend that they are not yet obliterated, and will give rise to dangerous hemorrhage. The same precaution should also be observed when the patient is so much debilitated as to lead us to suppose that he will be unable to bear the suppuration which will be required for the separation of the eschar. In these cases, it will be absolutely necessary, for the welfare of the pa-

tient, to retard the putrid fermentation, by drying up the eschars by means of absorbent powders, and by the application of pulverized alum, the sulphate of iron or zinc, the acetate of lead, and various other substances. The strength of the patient should at the same time be supported by a nourishing diet and the use of wine.

It is not always, however, that the surgeon is permitted to wait until the gangrenous tissues are completely detached from the parts to which they adhere, either because their elimination requires a profuse, tedious and exhausting suppuration, or because after the separation of the slough, even supposing that this took place without any unpleasant occurrence, there will remain a very large irregular wound, the cicatrization of which will be extremely slow and painful, on account of the necessary exfoliation of the bones and tendons which are exposed and project upon the surface of the wound. These unpleasant consequences can be prevented only by removing the bones by amputation. This operation, therefore, is always necessary when the whole thickness of a limb is completely sphacelated, when the disease, although slight, has penetrated into a joint, or when it has opened a large blood-vessel, which it is impossible to secure with the ligature without intercepting completely the circulation of the parts below it.

Before we have recourse to amputation, we should always carefully reflect upon the state of the patient's strength, and the complications of the disease.

Will it be proper to wait, before the operation be performed, until the dead and living parts are separated by a line of demarcation, as has been recommended by most authors, more especially by Thomson, Richter, Cooper, and Boyer; or will it be better to amputate while the disease is still progressing, as has been advised by Larrey, Lawrence, and Hennen? Experience seems to have shown that in cases of sphacelus resulting from gun-shot wounds in young and robust individuals, it will always be proper to operate as soon as possible; while in all other circumstances, where gangrene results from internal causes, or in consequence of inflammation in subjects with bad constitutions, it will always be more prudent to wait for the line of demarcation which separates the dead from the living parts.

HOSPITAL GANGRENE.

Most surgeons regard this affection as a variety of gangrene, which being of an essentially contagious character, attacks only the denuded surfaces of the body, such as wounds and ulcers, and converts the tissues into a homogenous putrid, or pulpy substance, of a yellowish white, cineritious or purple colour, in which no trace of their original texture is discernible. The causes to which this disease has generally been attributed, are what authors have improperly called debilitants; and amongst others, the situation of a hospital in a low marshy

ground; the vicinity of some source of infection; the crowded and unventilated state of the wards; unwholesome or insufficient food; and lastly, the contact of bodies that are impregnated with the fluids which exhale from the sores of those who are affected with the disease.

It is obvious from the above observations, that the principal means which are to be employed with the view of preventing the disorder, and of arresting its progress, must be almost entirely of a purely hygienic nature, and consist, 1st, In separating the patients, and in confining them in dry and well ventilated apartments, removed from every source of infection; 2dly, In keeping these apartments perfectly clean and dry; 3dly, When the patients can not be separated on account of the nature of the place, in preventing all communication between them and the healthy; 4thly, In frequently renewing the air of the wards by proper ventilators, or in destroying the contagious miasmata of the air, either by fumigations with chlorine or nitric acid, provided the patients do not suffer from pectoral complaints; or, by washing the floor and the walls with a solution of the chlorite of soda or lime; 5thly, In observing the strictest cleanliness in dressing the parts, taking care never to use any instrument, or any thing whatever that has been impregnated with the putrid matter of a wound.

The chlorine fumigations, according to Guyton Morveau, are made by mixing five ounces of the black oxide of manganese with two pounds of common salt. These two ingredients are to be triturated together and put into a glass vessel, and one pound of water and of sulphuric acid are then to be added.

The nitric acid fumigations are prepared by putting half an ounce of concentrated sulphuric acid into a glass vessel, to which is to be added by degrees an equal quantity of nitre. The glass should be placed upon the floor, and the mixture stirred with a glass tube.

Besides these hygienic means, the general treatment of hospital gangrene requires others, which, though not less important, are much more variable than the preceding. Thus, the patient should be put on the use of diluent and acidulated drinks at the very commencement of the disease, especially if there be very evident symptoms of reaction; but if there be predominant adynamic symptoms, it will be indispensably necessary to have recourse to the exhibition of tonics, especially to those of a stimulating character. In some instances, also, it will be necessary to resort to emetics or purgatives, to the employment of which the ancients attached the most implicit confidence, and prescribed them indiscriminately in almost every case of the disease; but it is only after having carefully ascertained the condition of the *primæ viæ*, and the necessity of these agents, that they should be prescribed, for in most instances they may be altogether superceded by the use of cold and diluent drinks.

The symptoms of febrile reaction, as well as those of local

irritation, such as severe pain, redness, and swelling of the edges of the wound, demand, as we have already said, the employment of diluent and acidulated drinks; the best of which are milk-whey, sweetened with the syrup of violets, a solution of the tartrate of potash,* and vegetable or mineral lemonade. These means, however, are frequently insufficient, and general bleeding, which was first recommended in these cases by Mr. Hennen, will become absolutely necessary; though this should not be done unless the inflammation is extremely intense, the patient strong and plethoric, and the disease in its incipient stage. If this precaution be neglected, the abstraction of blood will sometimes do harm. In performing the operation, the patient should be earnestly requested not to derange the apparatus before the puncture is completely cicatrized, for fear that the simple contact of his fingers or the linen of his bed, which are soiled with the fluids that escape from the wound, will transmit the disease to the puncture in the arm; a circumstance which has often been known to occur.

If, instead of the symptoms which we have just pointed out, the patient is greatly prostrated, has a small, feeble pulse, coldness of the extremities or of the whole surface of the body; and if the wound, although extremely painful, is covered with a soft, grayish, pulpy substance, and has discoloured edges, the surgeon should carefully ascertain from the appearance of these symptoms, the urgent necessity of raising the strength of the patient by means of tonic and stimulant preparations; and if, besides these distressing symptoms, there be much anxiety, with insomnolency and excruciating pain, he should by all means add anodyne remedies, such as laudanum, Dover's powder, and large and often repeated doses of camphor.

From what has been said concerning the use of internal remedies, it is evident, that they are calculated rather for removing complications, than for arresting the ravages of the disease. They act, in fact, merely as palliatives, and enable the system to bear the effects of the local disorder, or to place nature in a condition to produce a healthy inflammation, and throw off the disorganized parts by suppuration.

Local applications, therefore, are of the utmost utility, and are indispensably necessary in the treatment of this disease.

Local treatment.—The local treatment consists in applying clean dressings to the wound, and in washing the surrounding parts, and sometimes even the whole surface of the body, with soap and warm water. The bandages and lint should be frequently renewed, and never be used more than once, unless they have been carefully washed in ley.

At each dressing, the sore should be washed with a weak solution of the carbonate of potash, or vinegar and water, in such a manner, that the fluid which is to be dropped upon it,

* Two drachms of this medicine should be dissolved in a pint of water, and a small quantity taken every hour.

may loosen the grayish pulp which generally covers the wound. The adherent portions of this viscous layer should at the same time be carefully detached, by rubbing the parts with dossils of lint, or a piece of rough linen, until the surface of the wound is rendered raw and perfectly clean.

If the disorganization is small and recent, and is manifested only by the presence of a few grayish spots, or viscid exudations, and a very intense degree of pain, unaccompanied by any severe constitutional disturbance, all that is required is to wash the parts frequently with strong vinegar or a solution of mineral acid, and apply pledgets of lint, dipped in the same fluids. When the disease, however, is more advanced, we may resort to the method of Dussaussoy, which consists in covering the surface of the ulcer with several layers of the powder of bark, which are then to be moistened with oil of turpentine. This paste should be removed every twenty-four hours, and a fresh one applied, until the wound has completely changed its aspect. Dussaussoy asserts that when this composition becomes dry, it forms a fragile sort of coat, at the sides of which, and through which, the discharge escapes. It need scarcely be remarked, however, that when the bark is employed in this manner, it is highly injurious.

If the disorganization is more extensive, and is accompanied with severe pain, and symptoms of typhus, which generally occur in the advanced stage of the disease, the surgeon should have no hesitation to resort to cauterization, which is more efficacious than any other means that can possibly be employed in the treatment of hospital gangrene, more especially if it be performed with the actual cautery. This remedy has been recommended by most of the French surgeons since the time of Pouteau.

Before applying the actual cautery, all the pulpy viscid matter should be carefully wiped away from the surface of the wound by the means which we have already pointed out. Without this precaution, the cautery will become speedily cold, and lose its good effects upon the adjacent healthy parts. All the parts, therefore, should be carefully burned; and as the surface of the sore is often very irregular, the surgeon should be provided with proper instruments, that he may be enabled to enter the different sinuses. The application of the cautery should be repeated as often as it is necessary to produce a hard and dry slough.

When the cauterization is completed, the parts should be dressed according to the method of Dussaussoy; and at the end of twenty-four or forty-eight hours, that is, as soon as the phlegmonous inflammation, which separates the dead from the living parts, is established, and during the existence of the supuration which promotes the separation of the slough, the parts should be carefully covered with warm emollient poultices. If the pus, however, loses its consistence and acquires a disagreeable odour, and the ulcer has an unfavourable aspect, it

should be immediately covered with pledgets of lint, dipped in a strong decoction of bark, or any other kind of astringent substance.

When the pulpy viscid substance, which covers the surface designed to be cauterized, has acquired such a degree of thickness and consistence that it is impossible to remove it, so as to enable the cautery to act with sufficient advantage; or if, on account of any other cause, the iron can not be used, the wound should be cauterized by means of the caustic potash, which is to be cut into small pieces and introduced into the eschar. Recourse may likewise be had to the nitric or muriatic acid, the action of which should be promoted by proper incisions.

After the application of the cautery, at each dressing, the slough should be removed in proportion as it becomes detached, with a pair of scissors or forceps, and the sore carefully cleansed. Some surgeons are in the habit of employing a mixture of one part of basilicon ointment, and two parts of Venice turpentine, which is to be spread upon the parts, either alone, or upon pledgets of lint. In England, Fowler's solution of arsenic has been employed with much success, either alone, or in combination with twice its weight of water, in cases of this disease. Several pieces of lint of the same shape as the sore, but a little larger, being soaked in the solution, are to be applied to the cleaned surface, and renewed every fifteen or thirty minutes, according to the time in which they become dry. When the wound is deep and fistulous, we may use a syringe for cleaning the sore, and introducing the solution. In all cases, every part of the surface of the sore should be carefully touched with this medicine, which should be discontinued as soon as it produces a black and dry eschar, and the burning and lancinating pain which the patient formerly experienced, has subsided. Care should be taken always to dress the parts with the resinous mixture to which we have already alluded. Whatever may be the treatment that is adopted, the sore should always be treated, after the sloughs have become detached and the parts present a red appearance and secrete a laudable pus, like a common suppurating wound. If, on the contrary the granulations are soft, pale and painful, there will be every reason to apprehend a return of the disease. This should be carefully prevented by the course of treatment just pointed out, especially the use of the actual cautery.

In St. Bartholomew's hospital, London, the undiluted nitric acid has been used with great success as a local application to phagedenic ulcers, as may be seen by a very interesting paper recently published by Mr. Welbank.

Before the acid is applied, care should always be taken to protect the adjacent parts, by means of the common basilicon ointment, which is to be applied around the sore.

If, notwithstanding the means which have already been recommended, the disease continues to progress, the patient can only hope for safety in the amputation of his limb. This there-

fore, if his constitution be not too much deteriorated, should be done as early as possible; and in performing it, care should be taken to cut through the healthy parts, at a considerable distance from the seat of the affection.

PHLEGMON.

What has already been said concerning the treatment of inflammations in general, is perfectly applicable to phlegmon, which, in the most correct acceptance of the term, merely signifies a phlogose state of the subcutaneous cellular tissue, or of that which surrounds and connects the most superficial organs, more especially those of the extremities.

FURUNCULUS AND BENIGN ANTHRAX.

Furunculus and benign anthrax appear to be one and the same disease, differing only in degree of intensity. They both consist in a rapid and circumscribed inflammation of the skin and the subcutaneous cellular tissue. They acquire, in a short time, a very large size, and being firmly bound down by the subjacent parts, are apt to produce strangulation and gangrene.

Treatment.—The local treatment of these two diseases, therefore, consists in the employment of those means which are calculated to arrest the inflammation of the skin and cellular tissue, and to remove the strangulation of the parts, in order to prevent mortification. Thus, as soon as the nature of the tumour has been perfectly ascertained, it should be opened by a large crucial incision; and after the matter which it contains, has been discharged by gentle pressure, it should be constantly covered with emollient and anodyne poultices, until the inflammatory symptoms have completely subsided, and the sloughy cellular substance has been removed. As soon as there is a secretion of healthy pus and the bottom of the wound is covered with fleshy granulations, all the dressing that will be required until the wound has cicatrized, is the application of a few pledgets of lint.

An incision made into the tumour is generally preferable to the application of ointments or other substances, as well as to leeches, scarifications, and the circular incision which has been recommended in the treatment of anthrax, and more especially to the employment of cold applications. It fulfils, in fact, every local indication, produces a more or less profuse discharge of blood, removes the strangulation and gives vent to the soft and disorganized parts. This incision, which is to be made with a lancet or bistoury, according to circumstances, should be extended beyond the margins of the tumour, and should be either straight or crucial, according to the extent and intensity of the disease.

These means are still applicable when the anthrax has arrived in its second stage. The same observation holds good in the third stage of the disease, after the spontaneous opening of the tumour; but then they are no longer designed to allay the inflammation, but merely to promote the expulsion of the dead cellular tissue, which, so long as it remains in the wound, keeps up suppuration and prevents the process of cicatrization. When these means, however, do not speedily produce the desired effect, the surgeon should excise the sloughy tissues, or remove them with a pair of forceps, in proportion as they become more loose at the bottom of the wound.

When the furunculus or anthrax is purely local, and does not appear to be connected with a general disposition of the system, the treatment which we have just pointed out will generally be sufficient, even sometimes independently of the incisions. But when the furunculi make their appearance in great numbers, and seem to depend upon a peculiar condition of the *primæ viæ*, it will be necessary, especially if the symptoms be severe, in addition to the local treatment, to have recourse to emetics, or aperient drinks, to diluents, the warm bath, and various other means.

It sometimes happens that the anthrax is accompanied by very evident symptoms of adynamia, especially when it has arrived in its second or third stage, without having been properly treated. Under these circumstances, we should carefully ascertain whether the symptoms be owing to a real debility of the general system, as is frequently the case in old drunkards or debauchees, or whether they be the consequence of severe irritation, and inflammation of the principal digestive organs. In these two cases, surgeons are generally in the habit of employing different kinds of remedies. In the first, recourse should be had to the treatment that has been recommended in cases of gangrene; in the second, reliance must be placed chiefly upon antiphlogistics.

CARBUNCLE OR MALIGNANT ANTHRAX.

A carbuncle is a tumour of an essentially contagious nature, which is always connected with a general contagious disease, and requires, besides a proper constitutional course of treatment, very active local measures, precisely similar to those which are employed in the latter stages of the malignant pustule.

MALIGNANT PUSTULE.

The malignant pustule is a purely local disease; it is always produced by the contact of substances that have been impregnated with virus, arising either from animals suffering from carbuncle, from flaying animals that have perished from this disease, or from touching the parts that are the seat of the ma-

lignant pustule. In the human subject, therefore, the treatment of this affection should always be purely local, except in the fourth stage or towards the termination of the disease, when it is characterized by very dangerous constitutional symptoms.

The malignant pustule is at first confined to the superficial parts of the integuments, but as it must necessarily extend and become a general disease, the first indication to be fulfilled is to protect the sound adjacent parts from its influence, to restrict its limits, and to concentrate the action of the virus to the point which it originally occupied. The means which are calculated to fulfil these indications are incisions and the application of caustics, which form the fundamental parts of the treatment.

At the commencement of the disease, when the malignant pustule is presented under the form of a vesicle, filled with serum, it should be immediately opened by a large incision in order to evacuate its contents. When this has been done, the denuded surface of the sore should be carefully wiped, and a dossil of lint, soaked in the chlorite of antimony, or a piece of caustic potash, should be applied to its central part, and covered with a piece of dry lint, a strip of adhesive plaster and bandage.

After five or six hours, the apparatus should be removed, and the eschar dressed with pledgets of lint smeared with some suppurative ointment, or, what is still preferable, a linseed poultice. The next morning the parts should be again examined, and if there be no hard engorgement, or any new phlyctenæ, but merely a slight degree of tension and heat, there will be every reason to suppose that the caustic has produced the desired effect, and that the disease is entirely destroyed. It will suffice then to promote the separation of the slough, and to treat the case precisely in the same manner as in the application of the actual cautery.

If, on the contrary, the parts are covered with new vesicles, are swollen and œdematous, they should be again cauterized, taking care to remove the eschar before the caustic is applied, in order to promote its action.

If the disease has arrived in its second or third stage, that is, if there be an engorgement and burning pain, accompanied by a yellowish, purple, or orange coloured prominent circle, and if the adjacent parts, being tense and bright, are in an œdematous state, and there is a hard dry eschar, surrounded by phlyctenæ,* in the centre of the tumour, recourse should be immediately had to large and deep incisions carried to such an extent as to embrace the whole thickness of the hard and tumefied tissues, without penetrating into the healthy parts.

* It is not until this period, that the surgeon is generally called in, because the symptoms of the disease are apparently so trifling that the patient remains in heedless security.

These incisions or scarifications, which are intended to give vent to the altered fluids and to promote the action of the caustic, should be sufficiently numerous to answer the desired effect; but, in making them, great care should be taken not to plunge the instrument too deeply, and to leave some of the diseased parts untouched. In the latter case, the progress of the disease will be but imperfectly arrested; while in the former, they will cause useless pain or severe hemorrhage, or at all events, an oozing of blood, which must be necessarily disagreeable, inasmuch as it destroys the effects of the caustic, and debilitates the patient, which is always dangerous.

When these scarifications are made, the tumour should be gently compressed, in order to disgorge its contents. The parts are then to be carefully washed, and the caustic is to be applied, which creates a disorganization of the diseased parts, acts upon the deleterious fluids which they contain, prevents their absorption or unpleasant effects, produces a healthy action in the surrounding parts, and enables nature to throw off the disorganized tissues by suppuration.

The caustics which have generally been recommended by practitioners, are the liquid chloride of antimony, and the nitrate of mercury, dissolved in nitric acid. These caustics appear to be preferable to those of the solid kind. The manner of using them consists in dipping a sufficient number of pledgets of lint in them, and applying them to the affected parts, taking care to renew them in about twenty-four hours, if the disease does not appear to be completely destroyed. During, as well as after, the separation of the slough, the parts should be dressed as in cases of gangrene.

The same local treatment is likewise applicable when the disease has arrived in its fourth stage, and is characterized by considerable swelling, by the extension of the gangrene, and, more especially, by the concentration and smallness of the pulse, anxiety, delirium and the other symptoms which indicate that the affection has become general. Under these circumstances, however, it will be necessary, in addition to the means already pointed out, to exhibit tonic and stimulant medicines, such as wine, bark, and camphor.—*See the treatment of gangrene.*

PERIOSTOSIS.

Periostosis, or swelling of the periosteum, generally arises in consequence of a constitutional syphilitic affection, and therefore imperiously demands, in all cases, not only a proper local treatment, but the employment of mercurial preparations, which are ordinarily capable to produce resolution, provided the tumour is still small and uninfamed.

Local treatment.—If the tumour be painful, augments by degrees, and is accompanied by symptoms of inflammation, speedy recourse should be had to leeches, to emollient and se-

dative applications, and to all the means which are usually employed for arresting the progress of a phlegmonous abscess. Great care should always be taken to prevent these tumours from terminating in suppuration, because, if this occurs, it seldom happens that the bone itself does not participate in the affection, and is more or less considerably necrosed at the bottom of the abscess. When, by means of this mode of treatment, the inflammation has subsided, although the tumour itself may not disappear, the surgeon should have recourse to the employment of resolvent applications with the view of producing resolution or of preventing induration. This termination in induration, the only one which generally takes place in cases of periostosis, is accompanied by a sensible diminution of the size of the tumour, and leaves no other inconvenience than a more or less considerable deformity. The best resolvents that can possibly be employed in the treatment of this disease, are the mercurial or common soap ointment, mercurial frictions, and revulsive blisters.

If the periostosis has been left entirely to the operations of nature, or if, notwithstanding the employment of the antiphlogistic treatment, the suppuration continues, the pus should be speedily discharged by a free incision, which should be kept open until the mortified portion of the periosteum has sloughed off, or until the exfoliation is completed, provided the bone is in a state of necrosis. It need scarcely be observed, that when the periostosis is completely indolent, hard, and stationary, and does not, by its position, interfere with the exercise of any important function, every kind of treatment will be perfectly useless.

EXOSTOSIS.

An exostosis is a tumour formed by a more or less considerable enlargement of a part, or the whole of a bone, and is the result of various alterations of the osseous tissue, which are themselves produced either by external causes, such as a cut, or blow, or by a scrofulous or venereal taint of the system. Although the anatomical characters of this disease are perfectly well understood, yet this is by no means the case with regard to its etiology and diagnosis, and more especially with regard to its treatment, since those cases of exostosis which are of a venereal nature, are the only ones that can be treated, in the present state of the science, with any prospect of success.

Every part of the osseous system is more or less liable to exostosis, but the bones which are most frequently affected are the inferior maxilla, the sternum, and the long bones of the extremities, particularly the femur and tibia.

Indications.—The principal indications which are to be fulfilled in the treatment of exostosis, are, 1st, To restore the bone to

its natural condition, by creating an absorption of the substances which are deposited into the tumour and produce its enlargement; and 2ndly, To remove the exostosis by means of a surgical operation, when it is impossible to produce its absorption. The first indication can never be expected to be fulfilled when the tumour is of long standing, or is owing to a general taint of the system. The treatment, therefore, must always vary according to circumstances. It should consist not only of those means which are calculated to correct the general state of the system, such as mercurial and anti-scorfulous preparations, but also of such as shall act immediately upon the diseased part, as soft emollient poultices, if there be pain and inflammation, or stimulating applications, if the tumour be perfectly indolent. Amongst the latter, resolvent plasters, saline or hydro-sulphureous frictions, and leeches applied frequently and conjointly with blisters, deserve the greatest confidence and are often of the utmost advantage.

When an exostosis, of whatever nature it may be, has obstinately resisted the treatment that has been employed for its cure, and continues to increase, so as to interfere, or threaten to interfere, with the exercise of some important function, and causes severe pain or any other symptom which may endanger the health or life of the patient, the only chance of cure is the removal of the tumour, if its situation and extent are such as to admit of it, or the amputation of the limb, if its removal be impracticable.

As the application of the actual or potential cautery is either insufficient or dangerous in the removal of an exostosis, surgeons generally prefer the knife, unless the disease is located either in a cavity where it is impossible to approach it, or amongst some important organs, with which it is necessary, but dangerous to interfere.

Operation.—In removing an exostosis, it should be freely separated from the surrounding soft parts, by means of a bistoury. If the tumour be small, but has a large base, and the skin healthy, it should be exposed by a crucial incision, and the flaps dissected up and turned back. If, on the contrary, the skin is altered, it should be carefully removed, with the precaution, however, to preserve as much of the healthy part as possible, in order that the wound may be easily covered after the operation. When the tumour has been exposed, it should be removed as circumstances will allow, either with a gouge and mallet, with a pair of bone nippers, or by means of a saw.

The saws which are now generally used for this purpose, are those which were invented by the late Mr. Hey; or the perpendicular wheel-like saw of Mr. Machell, of London, which is turned by means of a handle connected with the machinery, and is extremely well calculated for cutting bones at a great depth, without injuring the soft parts.

When the base of the tumour is narrow, it should be exposed by two semi-elliptical incisions, the flaps of which should

In all kinds of caries, it is necessary either to change the action of the diseased portion of bone, in such a manner as to enable it to regain its original condition, or to destroy it altogether, and then to promote the process of cicatrization, by producing a healthy inflammation and suppuration in the adjacent parts.

As caries, like ulceration of the soft parts, generally arises in consequence of a venereal, scrofulous or scorbutic taint of the system, the surgeon should carefully ascertain to which of these causes it is owing, and endeavour to remove it by a well directed course of internal remedies. By this means, the ulcerated surface will frequently cicatrize without any other local application than simply dressing the parts with dry lint. When, however, it results from external causes, or is connected with a morbid condition of the system, and remains stationary, notwithstanding a proper constitutional treatment, it should by all means be combated by local applications.

In commencing the local treatment, the first object should be to allay the irritation of the subjacent soft parts by the usual means; and then, if the caries be superficial, the diseased part should be daily bathed with a decoction of detergent aromatic plants, such as the *thymus vulgaris*, sage, *vinca minor*, and the leaves of the common walnut tree, or with a solution of soda, carbonate of potash, soap, or the *hepar sulphuris*, which should be at first weak, and gradually increased in strength, without, however, making it so irritating as to produce inflammation. These baths, which are to be continued for a considerable time, should be aided by topical stimulants, such as camphorated alcohol, the tinctures of myrrh and aloes, benzoin, or any other similar fluid.

If, on the contrary, the caries be deep-seated, and the local applications just alluded to can not be employed, or are not productive of any benefit, the only thing to be done is either to extract the fragments of the bone or to disorganize them. The choice of these two methods must be regulated by the seat and extent of the disease and a variety of other circumstances.

The cauterization of a carious bone may be performed either by means of the liquid caustics or the hot iron; but as the former are uncertain in their effects, and even frequently dangerous, the latter has been generally preferred, because, when applied with sufficient firmness, it is almost invariably attended with success.

In applying the actual cautery, the parts should be firmly held by a few assistants, while the surgeon exposes the bone either by simply enlarging the fistulous opening, or by a few large incisions proportioned to the supposed extent of the disease. In some instances it will also be advisable to rasp the surface of the bone, in order to ascertain precisely the extent of the caries, and thus render the action of the cautery more certain and efficacious. Before applying the instrument, the bone should be carefully separated from the soft parts, and, if

be dissected up, and when the peduncle is uncovered, the periosteum should be divided with the bistoury, and the exostosis sawn away. If the subjacent portions of bone be healthy, the edges of the wound should then be approximated and covered with lint.

If, on the contrary, the exostosis itself adheres by a large base, and is insensibly confounded with the body of the bone, it will be necessary to divide it into several portions, either by perforating it at different points with the perforator of a trephine, or by several turns of the saw, and then detaching the pieces with a gouge and mallet.

These methods are generally sufficient in cases of very hard osseous tumours, but they are by no means applicable to all cases of exostosis. Thus, when the tumour has opened spontaneously, and is filled with fungous excrescences, the most delicate parts of the bony laminæ should be removed with a pair of strong scissors, the excrescences should be extirpated, and all that can not be cut away with the scissors, should be removed with the saw or gouge. The surface of the bone should then be carefully cauterized, in order to destroy its morbid disposition. If an exostosis of this kind does not open of itself, it should be perforated with a trephine, in the manner we have already pointed out.

When the operation is completed, the parts should be carefully examined, in order to ascertain whether the diseased bone has been effectually removed; and if this is found to be the case, they should be dressed like a common suppurating wound. If, on the contrary, the whole has not been destroyed, more especially after the extirpation of a fungous exostosis, the rest should be carefully removed, either by means of a pair of bone-nippers, or the actual cautery. The exfoliation of the bony fragments is gradually effected, to promote which the treatment should be confined to the application of pledgets of dry lint.

CRIES.

Caries is perfectly analogous to ulceration of the soft parts, and should by no means be confounded with necrosis. A necrosed bone is a bone deprived of life, while a carious bone is the seat of a peculiar morbid process, by virtue of which its substance becomes soft and eroded, and emits a fetid, dark-coloured, sanious fluid, and is soon destroyed and removed in more or less considerable fragments, or becomes the seat of a purulent discharge.

All the bones are liable to caries; but those of a spongy texture are more frequently attacked, than such as are compact. Hence, the vertebræ, astragalus, and other bones of the tarsus, those of the carpus, the sternum, the bones of the pelvis, and the heads of the long bones, are often affected; and the bones of young persons are unquestionably more frequently the seat of caries, than those of old subjects.—*Boyer on the Bones*, Vol. I, p. 165.

of the bones, to cut away these parts, so as to preserve the limb; but, although this operation has been performed with some degree of success, even upon the inferior extremities, one of our most experienced practitioners has limited its employment to caries of the scapula, "because in all other circumstances," says he, "the irregularity of the bony pieces around the diseased joint requires a tedious and difficult operation, the success of which is rendered extremely doubtful in consequence of the severe injury of the adjacent parts; and even supposing that the patient should recover from the original disease, we could only obtain imperfect success, on account of the shortening and deformity of a limb, the preservation of which was achieved with so much pain and suffering."

As the operation of excision of the articular extremities of the bones, however, has been several times successfully performed, and has attracted the attention of eminent surgeons, we shall point out the mode of operating in the article of caries of the bones of the extremities, but in those cases only where the utility of the operation has been confirmed by experience.

CARIES OF THE BONES OF THE CRANIUM.

The use of caustics, and more especially of the actual cautery, should never be resorted to in this disease, on account of the vicinity of the brain, which is in danger of being injured. When the caries is small and superficial, and merely occupies the external table of the bones of the cranium, a cure may generally be effected by simply applying irritating substances, and particularly the balsamic tinctures. But in all other cases, recourse should be had to the knife, as the most efficacious means, especially in those cases where the caries has invaded the whole thickness of the bone or only its internal table.

The diseased portion of bone, therefore, should be brought into view, and removed, either by making several perforations with the crown of a trephine, or by means of an exfoliator, a lenticular knife or a pair of bone-nippers, and the parts should be dressed until the cicatrization is completed, like a simple suppurating wound. If, however, there remain any diseased portions of bone, they should be speedily detached with the knife, or their exfoliation should be promoted by covering them with detergent irritating applications. After the wound has perfectly healed, the parts should be protected with a piece of thick leather or paste-board.

CARIES OF THE BONES OF THE FACE.

This disease requires the same treatment as caries of the bones of the cranium; but in addition to it, we may resort to

it be necessary, they should be protected with pieces of linen or paste-board, or a canula, according to the circumstances of the case. The iron should then be applied, and notwithstanding the cries of the patient, the operation should be continued until the diseased portion of bone is completely destroyed.

After the operation is completed, the parts should be dressed, in order to promote the separation of the dry eschar. If, however, there arise none of the local inflammatory symptoms which are necessary for the removal of the dead bone, and the fungous granulations reappear, it will be necessary to have again recourse to the actual cautery.

When the caries is so deeply seated in the substance of a bone, that the application of the cautery must be frequently repeated, without there being any certainty of destroying the whole of the diseased portion, it will be absolutely necessary to precede the cauterization by the extraction of the most superficial parts of the bone, by means of a gouge and mallet, a trephine, or a saw. This method, in fact, has been recommended by some surgeons as the safest and most efficacious means that can possibly be resorted to in cases of this kind. In employing it the caries should be completely destroyed, either by means of a strong bistoury, or a pair of bone-nippers, according to circumstances, and the wound should be dressed with pledgets of lint until cicatrization has taken place, which is to be promoted by some of the means which will be pointed out in the chapter on suppurating wounds.

In some instances, however, it is impossible to effect a cure, and all that can be done is to leave the disease to the operations of nature. This is the case more particularly when the caries occupies almost the whole or a great part of a bone, and can not be removed without a great degree of danger; or where the disease appears to be stationary, and the health of the subject is so much disturbed, as to induce us to believe that the exfoliation can not be effected without great danger, and that the cicatrization will be imperfect.

The duty of the surgeon, therefore, invariably consists in placing the diseased part in a state of repose, and in prescribing a proper regimen, in order to enable the patient to bear the debilitating effects of a profuse suppuration; and if the disease be located in one of the joints, the limb should be put in such a position, that, in case there arises an ankylosis, it may still be used or be as little troublesome as possible. When the caries is so extensive that it can not be removed with the knife or other instruments, and gives rise to a copious suppuration, accompanied by severe symptoms of hectic fever, such as a considerable degree of emaciation, continued fever, with quotidian paroxysms, profuse night sweats, loss of appetite and sleep, and colliquative diarrhœa, amputation will be the only chance of saving the life of the unhappy sufferer. In order, however, to avoid this unpleasant resource, surgeons have recommended, when the caries occupies the articular extremities

rious bone. For this purpose, each side of the tumour, which is formed by the spinous processes of the vertebræ, should be cauterized by means of the caustic potash, the moxa, or hot iron. These issues should be sufficiently large and deep to be capable of receiving several peas. If the gibbosity be small, two issues will generally suffice; but in the most severe cases of the disease, four or even more will be necessary. Care should be taken to keep up a profuse suppuration by means of some epispastic salve, and, if the issue have any tendency to close, it should be immediately opened.

This treatment is, in most cases, successful, but it is necessary to continue it for several months, and sometimes even for several years. It should be persevered in not only until the matter is completely absorbed, and the fistulous openings closed, but until there is every certainty that the deformity is arrested, that the movements of the whole trunk may be executed without pain and difficulty, and that the strength of the patient is perfectly re-established.

If there should arise an abscess from congestion in a part more or less remote from the seat of the caries, we should endeavour to remove it by absorption, whatever may be its size, by the repeated application of the moxa or blisters, and by rubbing the parts with the unguentum antimonii tartarizati.

If these means are not sufficient to arrest the ulceration of the bones, and to produce the absorption of the parietes of the abscess, we should by no means wait for a spontaneous opening; but should puncture it in such a manner that the pus may be slowly discharged, in order that the parietes of the fistulous course and of the abscess, may contract in proportion as the fluid escapes, and prevent the introduction of the air; a circumstance which should always be carefully avoided. It is not necessary, therefore, as was formerly recommended by surgeons, to wait for the spontaneous opening of these abscesses, for this would give rise to a still greater separation of the adjacent parts, and to a large opening, accompanied with loss of substance, which would give free access to the admission of air.

The opening of an abscess from congestion is effected by means of a trocar or the point of a straight bistoury. The instrument should be introduced obliquely through the integuments; or, before commencing the operation, the skin may be drawn towards the inferior part of the tumour, and secured there during the discharge of the matter, after which it should be abandoned, in order that the integuments, when restored to their former situation, may close the orifice of the incision. The matter, as we have already said, should by no means be discharged all at once, but should be permitted to come away in small portions; and when a sufficient quantity has been evacuated, the tumour should be covered with a few pledgets of lint and a soft poultice. This operation should be daily repeated, taking care at the same time to support the strength of

the application of the actual cautery, especially when the caries is seated in the gums, or the lower jaw. It should not be forgotten, also, that as this disease frequently depends upon a venereal taint of the system, it may sometimes be easily arrested by the employment of an anti-syphilitic method of treatment.

The caries of the osseous parietes of the maxillary sinus, requires the same mode of treatment as abscesses of the antrum Highmorianum. As to caries of the os unguis, its treatment comes naturally under the head of fistula lachrymalis.

CARIES OF THE VERTEBRÆ.

Here the disposition of the parts gives rise to different indications, and to particular therapeutic means. It is necessary not only, as in all other kinds of caries, to change the morbid action which gives rise to the destruction of the osseous tissue, and the discharge of purulent matter, but also to induce the absorption of the pus in proportion as it is secreted, and thus prevent its accumulation, or at all events the rupture of the cyst in which it is contained, since experience has proved that the spontaneous opening of these kinds of abscesses is attended with the greatest danger. The local treatment of most other kinds of caries, moreover, is by no means applicable in the disease before us, in consequence of the impossibility of introducing instruments into the diseased parts. The only thing that can be done, in fact, is to remedy the cause of the disease, which is generally owing to a scrofulous, rheumatic, or scorbutic state of the system; at the same time that we endeavour to remove the ulcerative inflammation of the vertebræ, by keeping up a continued and more or less profuse discharge of matter in the vicinity of the diseased part, according to the degree of the disease and the strength of the patient.

General treatment.—The general treatment of this disease differs according to the nature of the cause. But, whatever may be the remedies which are resorted to, it is always necessary to support the strength of the patient by a proper and nourishing diet, and to promote the cicatrization of the diseased bone by preventing the motion of the spine. This last indication is to be fulfilled by subjecting the patient to absolute rest upon a firm and comfortable bed. The best beds for this purpose, are those which are made of hair or fern.

These means, as well as those which will presently be pointed out, should always be used when the caries of the vertebræ is so deep as to give rise to a considerable degree of gibbosity; but when the affection is superficial, or is confined to the laminæ or spinous processes of the bones, and results from external causes, local treatment will alone be necessary.

Local treatment.—The local treatment consists chiefly in the application of several issues in the neighbourhood of the ca-

of the parietes of the thorax, the diseased parts should be carefully removed with a pair of curved scissors; and the opening should be immediately covered with a piece of linen, spread with simple cerate, in order to prevent the introduction of air into the chest. This linen, together with a few pledgets of lint, a compress and bandage, composes the whole apparatus that is required for dressing the parts.

The operation for removing portions of carious ribs was first performed by the celebrated Richerand, of Paris, and has since been successfully repeated by Professor M'Clellan of Philadelphia, and by Dr. William A. M'Dowell of Virginia.

CARIES OF THE EXTREMITIES.

When caries occupies the articular extremities of the bones, and presents such a degree of intensity as to leave no hope of arresting its progress, the surgeon should have no hesitation in excising the diseased parts, as the only chance of effecting a cure.

This object, as we have already said, may be accomplished in two ways; either by amputating the limb above the disease, or by cutting out the carious articular surfaces. The first method is always preferable if the caries be seated in the coxo-femoral and tibio-femoral articulations; the second, when it is located in the scapulo-humeral, cubito-humeral, radio-carpal, and even the tibio-tarsal articulations. Amputation, however, should always be preferred, when the disease has made extensive and deep-seated ravages in the subjacent soft parts. For, under these circumstances, the disease has sometimes been known to reappear after a careful excision, and to produce such severe destruction amongst the soft parts, as to render amputation absolutely necessary.

EXCISION OF THE ARTICULAR EXTREMITIES OF THE BONES.

Necessary instruments.—All the instruments which are required in this operation, are a tourniquet, a few strong bistouries or straight knives, a saw, a pair of scissors, a gouge and mallet, and a few pieces of paste-board, lead, or copper, in order to protect the soft parts during the division of the bone.

Dressing apparatus.—The dressing apparatus consists of ligatures, lint, compresses, bandages, sponges, and warm water.

Operation.—Previously to commencing the operation, the patient should either be seated upon a firm chair or placed in the recumbent posture, according to circumstances, and be held firmly by a few assistants.

The operation consists of two steps; in the first of which, the surgeon divides the soft parts, in order to bring the bone fairly into view so as to be enabled to saw it through; in the second, he accomplishes the excision of the articular extremity. In cutting the soft parts, great care should always be taken not

the patient, and prevent the bad effects of the absorption of the matter by tonic and analeptic remedies.

CARIES OF THE STERNUM.

The treatment of caries of the sternum is precisely the same as that of other bones, excepting that surgeons generally prefer the employment of the knife to that of the actual or potential cautery.

The excision of portions of the sternum should never be attempted unless the disease is superficial, and has resisted the employment of proper local and constitutional remedies, or is old and deep seated, and unaccompanied by any chronic lesion of the thoracic viscera. The operation presents no peculiarities, and all that was said in speaking of the treatment of caries in general, is perfectly applicable to the disease before us. If, however, in performing the operation, the surgeon perceives an alteration of structure in any of the cartilages, they should be carefully removed; and if he interferes with the internal mammary artery, the hemorrhage may be easily arrested by the application of the ligature, or by compressing the vessel with one of the fingers against the condensed and adjacent soft parts.—When the pericardium has been opened, there remains, according to the illustrious Harvey, a fistulous opening, through which the heart may be seen to pulsate: this should be closed by means of a proper obturator.

CARIES OF THE RIBS.

Caries of the sternal extremities of the ribs and of their middle parts, can only be removed by the knife; while that which attacks the posterior extremities, requires to be treated in the same manner as caries of the vertebræ, with which it is generally connected. The excision of a portion of rib will be much easier in proportion to the thickness of the pleura costalis; and when this membrane, as it frequently happens, is detached from the rib, and forms the wall of a purulent abscess. The operation should never be attempted unless the disease be of long standing, has resisted a proper constitutional course of treatment, and appears to extend its ravages. This precaution should be particularly observed in scrofulous subjects, more especially if the caries is superficial, and the matter is discharged with facility and in small quantities.

Operation.—The rib being fairly brought into view, the intercostal muscles should be carefully detached from its edges by means of a probe-pointed bistoury, and the carious portion removed by a small saw from fifteen to eighteen lines in length. If the pleura be healthy and still adherent, it should be separated from the rib with the finger or the extremity of a female catheter; if, on the contrary, it be altered, as in cases of cancer

more complicated than either of the preceding, is by far the most useful in severe chronic diseases of the scapulo-humeral articulation, accompanied with swelling and enlargement of the bones. In performing the operation, the patient is to be seated upon a firm chair, and the subclavian artery is to be compressed either above or below the clavicle. The patient's arm should then be elevated in a horizontal direction, and the bistoury plunged through the parts as far as the bone, near the top of the coracoïd process, on a level with the superior margin of that eminence. The skin and deltoïd muscle are next to be divided by an incision of about three inches in length, extending along the outer edge of the bicipital groove. Behind, another incision should be made parallel with the first, and extending from the posterior extremity of the inferior edge of the acromion as far as the arm. These two incisions should be united by a third, directed across and passing immediately behind the acromion. As soon as the flap has been dissected up, and the posterior circumflex artery secured, the arm should be brought to the trunk, in order to enable the operator to divide the tendons and orbicular ligament, which is to be done by carrying the blade of the instrument between the head of the humerus and the glenoid cavity, and by pushing up the arm so as to make the upper extremity of the bone project through the wound. The humerus should then be sawn through, taking care to protect the soft parts by means of a compress.

If the disease is confined to the head of the humerus, the remainder should be carefully replaced, after having cut out the diseased portion, and the flaps should be approximated and kept in contact by means of a few sutures.

If the caries extends to the scapula, the anterior incision should be continued upon the humeral extremity of that bone, and every particle of the disease should be carefully removed with the gouge and mallet. The rest of the operation is to be conducted in the manner we have already pointed out.

EXCISION OF THE HUMERO-CUBITAL ARTICULATION.

The method most generally adopted in performing this operation is that which was devised by the elder and younger Moreau, of Bar. The patient being placed on his abdomen, upon a table covered with a mattress, the surgeon is to apply the garrot over the course of the artery, and make a vertical incision parallel with the crest of the internal condyle of the humerus, commencing two inches above the latter point, and extending as far as the bend of the arm. A second incision, of the same length, should be made along the crest of the external condyle, and be united with the first by a third, which is to be made in a transverse direction so as to correspond with the most elevated portion of the olecranon. The square flap which is thus formed, is then to be dissected up, in order to

to interfere with any of the vessels, nerves, or principal tendons; and in dividing the bone, it should be held perfectly firm, to prevent the saw from breaking it, or producing a disagreeable jarring motion.

When the operation is completed, the edges of the wound should be approximated, and dressed like a common suppurating wound. The parts are then to be put in the most proper position for the formation of ankylosis, and all motion is to be carefully avoided. Notwithstanding this, the parts should be gently moved from time to time, before the ankylosis is produced, in order to promote, if necessary, the formation of a false joint.

As this operation does not only differ according to the joint upon which it is performed, but also according to the condition of the diseased parts, we shall give a more detailed account of it in the following sections.

EXCISION OF THE SCAPULO-HUMERAL ARTICULATION.

Method of Mr. White.—This method, although extremely simple, is more particularly applicable in cases of comminuted fractures of the humerus, in consequence of gun-shot wounds, where the simple enlargement of the wound does not admit of the extraction of all the osseous fragments. In performing the operation the surgeon should make an incision, extending from the acromion process of the scapula to the middle of the arm; and when this has been done, the humerus should be dislocated and disengaged from the wound, by bringing it towards the body and pushing it upwards. The upper extremity of the os humeri should then be held with the left hand and cut out with an amputating saw, taking care previously to protect the soft parts with a compress or a piece of paste-board.

Method of Sabatier, modified.—This method may be adopted in case the bones are affected with caries or some other chronic affection, and the disease has made considerable ravages. It differs from the method of Mr. White in this, that, instead of one, the operator is obliged to make two incisions along the anterior part of the arm, from five to six inches in length. These two incisions should commence, the one at the coracoid, and the other at the acromion process of the scapula, and should be connected at their inferior extremity in the form of the letter V. The triangular flap which is thus formed, should then be dissected up, the head of the humerus should be pushed through the wound, and the tendons by which it is surrounded, as well as three-fourths of the capsule of the joint, should be divided. When this has been accomplished, the diseased portion of bone should be fairly brought into view and sawn off, and the flaps of the incision approximated.

Method of Moreau.—The method of Moreau, although

EXCISION OF THE TIBIO-TARSAL ARTICULATION.

Method of the elder Moreau.—In performing this operation, two incisions are to be made in the inferior part of the leg: one longitudinal, extending from the inferior part of the malleolus to within three or four inches above that eminence; the other transverse, commencing at the base of the former and extending as far as the insertion of the peroneus tertius. Having done this, the operator makes two other incisions on the internal side, of which one is to be longitudinal and similar to that on the external side; the other transverse, commencing at the preceding and extending as far as the tendon of the tibialis anticus. The longitudinal incisions should extend as far as the bones, while the transverse should only include the integuments.

When the flap is dissected up, the fibula should be separated from the tendons by which it is surrounded, and cut away with the chisel. The same is to be done with the malleolus externus and the bones of the tarsus. When this has been accomplished, the tibia should be isolated from the soft parts, and a wooden spatula passed under its posterior surface. The surgeon then introduces the narrow blade of a saw under the anterior muscles, secures it to its handle, divides the bone from before backwards, and separates the diseased parts from the tarsus by turning the foot outwards. If a portion of the astragalus be affected, it may by this means be readily removed.

After the operation is completed, the flaps should be maintained in contact by a few sutures, and the limb should be kept perfectly at rest, by means of two lateral splints, and a foot-board.

NECROSIS.

Definition.—Necrosis is the death of a bone; and, like a gangrenous eschar, it is a foreign body which nature endeavours to separate from the living parts.

“Bones most frequently affected.”—The bones which are most frequently affected with necrosis, are the tibia, femur, lower jaw, clavicle, humerus, fibula, radius, and ulna. Excepting the lower jaw and scapula, the process of regeneration has only been noticed in the cylindrical bones. From twelve to eighteen years of age is the time of life most subject to necrosis. The necrosis of the lower jaw, however, seldom occurs before the age of thirty. In some persons, the bones are affected at once, owing to constitutional causes.”

Treatment.—In the treatment of this disease, the first object of the surgeon should be to aid nature in her efforts to expel the dead portion of bone, and enable her by this means to effect a cure.

When the affection is confined to a small space, and is seated at a considerable distance from the joint, the simple treatment that is employed in cases of suppurating wounds will fre-

bring the inferior part of the humerus fairly into view. In case the olecranon is affected, it should be carefully excised, according to the excellent modification of this method by Professor Dupuytren. This celebrated surgeon commences the operation by making an incision through the fibrous sheath which contains the ulnar nerve, and brings it in front of the internal condyle of the humerus, where it is held by an assistant with a spatula. He then elevates the olecranon, whether it be diseased or not, in order to render it capable of projecting behind the articular surfaces.

Having done this and carefully detached the fleshy fibres from the humerus, the operator carries a wooden spatula upon his finger below this bone, in order to protect the soft parts, and saws it through, above the carious portion. In removing this portion, he must divide the ligament by which it is connected to the bones of the fore-arm, and if these participate in the affection, the diseased parts should be carefully excised by prolonging the two longitudinal incisions to the extent of about two inches, so as to form a flap below of the same dimensions as the first. After having dissected up this flap so as to expose the bones, they should be separated from the surrounding soft parts and sawn through, taking care at the same time not to injure the anterior brachial and biceps muscles.

When the surgeon has carefully ascertained that every particle of caries has been removed, the garrot should be relaxed, the necessary ligatures applied, and the flaps approximated, and kept in contact by means of a few sutures. The wound should be dressed with lint, and the limb should be placed in a semi-flexed position and covered with the bandage of Scultetus.

EXCISION OF THE RADIO-CARPAL ARTICULATION.

This operation, which was first performed by the younger Moreau, upon a young girl who retained the use of her arm, is thus described by Professor Roux: "The operator being armed with a scalpel, and taking care not to interfere with the vessels and nerves of the fore-arm, makes two longitudinal incisions along the outer edge of the radius and the inner margin of the ulna, as near as possible to their anterior side, and terminates them inferiorly on a level with the joint of the wrist. Having done this, he makes two transverse incisions, extending backwards from the inferior part of the former to the sides of the extensor tendons which partly cover the posterior surface of the joint. The flap which is thus formed, should then be dissected up, and the inferior parts of the bones of the fore-arm should be separated from the adjacent parts and sawn through. If any of the bones of the carpus be affected, care should be taken that they be properly removed."

ascertained the extent and mobility of the sequestrum, the surgeon should take the convex bistoury, and make two semi-elliptical incisions, which should circumscribe the fistulous aperture, and be somewhat larger than the dead portion of bone. The soft parts are then to be dissected up, and the aperture in the bone is to be enlarged by applying the crown of the trephine along one of its edges, taking care that the instrument shall embrace a small part of the fistulous opening. In some instances a single perforation is not sufficient, and it will then be necessary to make two, three, or even more, as circumstances may indicate. As soon as the surgeon has made a sufficient number of perforations to enable the sequestrum to be easily removed, he should destroy the osseous interspaces between the foramina by means of a chisel, and lay hold of the dead bone with a pair of dressing-forceps, and extract it. If the bone however be so large that it can not be removed, the aperture should be still farther enlarged, until the operator is enabled to accomplish his purpose.

If, as sometimes happens, the dissection of the flaps of the incision gives rise to a considerable hemorrhage, the wound should be properly dressed and the operation deferred until another time.

In perforating the bone, great care should be taken not to make more apertures than are absolutely necessary, for fear of weakening it and rendering it more liable to break. In applying the trephine, the surgeon should be cautious not to press too heavily upon the bone, in order to prevent the new one from being fractured.

Dressing.—When the operation is completed, the cavity in the bone should be filled with lint, and the parts should be dressed with pledgets of cerate, and covered with a soft poultice. The dressings should be continued until the wound is completely cicatrized, which is generally effected without the least exfoliation of the edges of the bone. The limb should not be used until a long time after the opening has become effectually closed, more especially if it be the thigh or leg, and there has been a considerable loss of substance.

SPINA-VENTOSA AND OSTEO-SARCOMA.

We shall speak of both these diseases under the same head, not because they are perfectly identical with respect to their causes and symptoms, and more especially their anatomical characters, but from the fact that the treatment is nearly the same, and is confined to the employment of a few palliative remedies or to the amputation of the limb.

The spina-ventosa of infants, which attacks the bones of the hand or foot, is the only species of this disease which is regarded by authors as susceptible of being cured, either spontaneously, or by the interference of the healing art. The means which are chiefly employed for this purpose are anti-scrofu-

quently be sufficient, in conjunction with a proper regimen, and constitutional remedies, to produce the desired effect; but in some cases, a more active treatment is absolutely necessary, in order to promote the operations of nature.

In all cases, it is necessary to combat the inflammatory symptoms; to give vent to the matter by opening the different abscesses, and enlarging the fistulous orifices; and to promote the discharge of the detached bony fragments by proper incisions, or to extract those which nature is unable to separate and expel.

If, by daily examining the diseased bone by means of a probe or a pair of dressing-forceps, the surgeon is convinced that the necrosed portion is moveable and completely detached from the rest of the bone, he should by all means endeavour to ascertain its size and form; and then, by comparing its dimensions with those of the opening of the soft parts, and more especially with those of the new bone, provided there be a sequestrum, he should judge of the possibility of its spontaneous removal or of the necessity of its extraction.

In general, the surgeon should never be in too much haste in resorting to very active measures; but should rather wait for some time, in order to enable the bony fragments to change their form, become diminished in size, and be discharged by the efforts of nature, or extracted with more facility; or until the disease be so much improved as to give rise merely to a sanious or purulent discharge, and produce no impediment in the functions of the affected limb. When the suppuration, however, is profuse, and the affection gradually augments and is accompanied with severe fever, intense pain, and marasmus, or a sensible alteration in the assimilative functions, the operation should by no means be delayed.

When the sequestrum is enclosed by a newly formed bone, or a kind of sheath formed by some of the healthy laminæ of the bone itself, and the surgeon is convinced that the new bone has acquired sufficient solidity to enable the limb to perform its functions, no time should be lost in removing the sequestrum, either by enlarging some of the apertures in the healthy bone, especially if the soft adjacent parts are thin, or by extracting it through the largest fistulous opening, and the one which is nearest its inferior extremity.

OPERATION FOR REMOVING SEQUESTRA.

Apparatus.—The apparatus which is required in performing this operation, is a convex and straight bistoury, a small saw, the crown of a trephine, and a pair of dressing and dissecting forceps.

Operation.—Previously to commencing the operation, the patient is to be placed upon a solid bed; and his limb, being extended upon a firm pillow, is to be held by two assistants. The parts should then be carefully examined, and after having

parts with blood, has been performed with various results upon the temporal, auricular, and occipital arteries, for fungus hæmatodes of the ear, and the adjacent parts; upon the carotid, for similar tumours in the eye or ear; and upon the collateral arteries of the fingers, in cases of fungus hæmatodes of their extremities. This operation should only be performed when it is impossible to extirpate the tumour, on account of the disposition of the parts or the unwillingness of the patient to submit to it.

The extirpation or amputation of a fungus tumour is undoubtedly the most certain and expeditious method that can possibly be adopted in cases of this disease; but when the tumour occupies an insulated and comparatively unimportant part, as one of the lips, a finger, or the pavilion of the ear, it will be best to remove such parts entirely, for fear of a return of the disease. The same observation equally applies to large tumours of the extremities, especially when they rapidly augment in size. In extirpating such tumours, the operator should always take care to remove the diseased skin, and to prolong his incisions beyond the supposed limits of the disease, not only with the view of taking out every particle of the altered tissues, but likewise to avoid the hemorrhage which is apt to take place in consequence of the preternatural development of the vessels of the parts.

In the treatment of fungus hæmatodes, the parts should always be kept perfectly at rest, and all irritating applications should be carefully avoided. If it be seated in one of the extremities, the limb should be properly elevated, and if the parts are painful and irritable, they should be kept constantly wet with a mixture of laudanum and water, and recourse should be had to the application of leeches. The patient should be confined on low diet, and his bowels should be frequently opened by mild laxatives, such as sulphur, cream of tartar and jalap.

CONTUSION—ECCHYMOSIS—BLOODY ABSCESES.

A contusion is an injury of the soft parts resulting from a blow or fall, unattended with loss of substance or solution of continuity of the integuments. Every contusion is immediately followed by a more or less considerable degree of pain, and an extravasation of blood, which results from the rupture of an infinite number of capillary vessels, and is manifested by the sudden appearance of ecchymoses or bluish spots, and sometimes by hard œdematous or fluctuating tumours. This kind of injury, when it takes place upon the splanchnic parietes, or in the vicinity of large nerves or blood-vessels, is usually accompanied by severe symptoms; but, under these circumstances, they form the principal disease, while the contusion is merely a symptom of a secondary consideration.

In the treatment of contusions, the practitioner has two indications which ought to claim his attention. The first is to

lous remedies; and the cure is effected by the death and exfoliation of the affected bones. Some surgeons have been in the habit, with the same view, of exposing the tumour and applying the actual cautery; but this method, which is frequently impracticable, is now generally abandoned, because as soon as the nature of the affection is understood, the whole circumference of the bone is already diseased.

As spina-ventosa or osteo-sarcoma does not endanger the health or life of the patient, all that should be done in the early stages of the complaint, is to endeavour to retard its progress by the employment of proper hygienic means, and to remove the complications of the disease. If either of these diseases, however, has acquired a large size, and has commenced injuring the health of the patient, the diseased portion of bone should be cut out as speedily as possible, or the limb should be removed by amputation. Before resorting to these measures, however, the surgeon should always take care to ascertain that there be no organic affection of any of the viscera, or an engorgement of the adjacent lymphatic vessels and glands; for if this be the case, the operation will be of but little avail.

FUNGUS HÆMATODES.

The only means from which it is possible to derive any benefit in this affection, are compression, the application of the ligature around the base of the tumour, cauterization, extirpation, and the tying of the vessels which nourish the diseased parts. Compression can only be advantageously employed in cases where the tumour is situated in the neighbourhood of a bone, has a broad base, and is unaccompanied by any lesion of the subjacent tissues. It can only be successful and unattended with inconvenience inasmuch as it is steadily continued, and gradually increased.

The ligature can never be employed but in cases of pedunculous tumours.

The employment of the actual cautery is indicated when the fungus is very large, and is so much confounded with the healthy tissues, that the application of the ligature or extirpation is impracticable, and when there is every reason to suppose that the anormal tissue may be entirely destroyed by two or three applications of the hot iron.

In some cases, however, these different means are either insufficient or dangerous, and should give way to compression or the application of the ligature to the vessels which supply the tumour. Compression and the ligature, in fact, act upon the same principle as the means above alluded to, but, independently of this, they have the advantage of arresting the hemorrhage, which frequently takes place when the tumour has acquired considerable magnitude, and has commenced to ulcerate.

The operation of tying the vessels which supply the diseased

Although we shall on the present occasion merely consider wounds in a general point of view, independently of the region or part of the body which they occupy, yet the observation which will be made will be more particularly applicable to wounds of the extremities.

SECTION I.

SIMPLE WOUNDS.

Every simple wound, or every solution of continuity of the soft parts which is made with a sharp cutting instrument, unattended with injury of the large vessels and nerves, or some important viscera, requires as the first indication to be fulfilled, the exact approximation of its edges until they are completely united. Under these circumstances, the adhesion of the sides of the wound is effected by what is usually called in surgical language, union by the first intention, which, according to the experiments and observations of surgical writers, may be attempted in every wound with perfect safety. It is in vindication of this opinion, that a modern surgeon has observed, "although in some instances union by the first intention can not be immediately effected, yet the patient will recover more speedily than if this had not been attempted." Experience has amply confirmed the justness of this assertion.

Before the surgeon attempts, however, to procure this adhesion, he should carefully ascertain that the wound is unattended by any complication.

In a recent simple wound, the surgeon may always judge by the quantity of the blood which is effused and the anatomy of the parts, whether it proceeds from an important vessel, or whether it is furnished merely by arteries of a small caliber, and if, in order to arrest it, a slight degree of compression will be sufficient. Care should be taken also to ascertain, either of the patient or his friends, whether the vulnerating body still remains between the sides of the wound. When no important organ has been affected, it may be easily known, in most cases, by the harmony and regularity of the functions of the parts, the nature and seat of the injury, and various other circumstances. If the wound is of a few days standing, and has received no surgical aid, its appearance will generally indicate whether its edges are inflamed, or whether there are any other local complications, such as gangrene, a collection of matter, &c.

Finally, before the edges of a wound are approximated, they should always be carefully examined whether they are susceptible of immediate adhesion; which may be known, in a recent wound, by their raw and bloody appearance, and in a suppurating one, by small red-coloured cellulo-vascular granulations.

prevent and diminish the inflammation, which, from the violence done, must be expected to arise; and the second, to promote the absorption of the extravasated blood by discutient applications.

If there be merely a slight degree of tumefaction or a small ecchymosis, unaccompanied by any severe pain, the absorption of the fluid may generally be effected by keeping the parts perfectly at rest, and covering them with linen constantly wet with the liquor plumbi acetatis dilutus.

If the contusion, however, be severe, and is accompanied with violent pain and an inability to move the limb, it will be necessary to apply leeches, and this repeatedly, to keep the parts in the most perfect rest, and to apply cold discutient applications. If the patient be robust and plethoric, it will be proper also to take blood from the arm, and resort to the use of the ordinary antiphlogistic remedies.

The local inflammation should be combated by the usual antiphlogistic applications; and as soon as it has subsided, we should endeavour to remove the extravasated fluid by exciting the action of the absorbent vessels, if there be merely an ecchymosis, or by opening the bloody abscess.

Extensive ecchymoses and even small bloody abscesses, attended with fluctuation, may frequently be removed by discutient applications, such as Goulard's wash, a solution of the hydro-chloride of ammonia, camphorated brandy and acetate of ammonia, or a saponaceous or camphorated liniment, and by compression or pumping cold water two or three times a day upon the affected part.

But if, notwithstanding these applications, absorption does not take place, and the parts be painful and have a tendency to suppurate, the extravasated fluid should by all means be discharged by a free incision.

WOUNDS.

Wounds present different indications, according as they are simple or complicated, that is, according as there is merely a simple division of the cutaneous and muscular tissues, with a tendency to cicatrization, either immediately, or after suppuration, or as there is, either primitively or consecutively, an injury of some important organ, or a general derangement of the functions of the system, and an obstacle to the process of cicatrization. They also differ essentially according to the seat and extent of the injury, the nature of the instruments with which they are inflicted, and according to a variety of other circumstances.

Wounds are generally distinguished by surgical writers into simple, complicated, incised, punctured, contused, lacerated, poisoned, and gun-shot wounds. They also make a still farther division into those of particular regions or parts of the body, as wounds of the head, face, thorax, abdomen, &c.

wards. Care should be taken to introduce the needle at the distance of from four to five lines from the edge of the wound, near one of its angles, lest the ligature should tear through the integuments.* The other stitches required are to be made in the same manner, at the distance of about one inch from each other; and when the ligatures have all been passed, they should be tied on the sides of the wound, while these are carefully approximated by an assistant.

The needles for making the interrupted suture will pass with the greatest facility, when their shape corresponds exactly with the segment of a circle, and they should always form a track of sufficient size to allow the ligatures, which they draw after them, to pass through the flesh with the utmost ease.—*S. Cooper, Surgical Dict.*

The number of stitches must depend, in great measure, upon the extent of the wound and the nature of the parts which it occupies.—In tying the ligatures, great care should be taken not to draw them too tightly, lest the edges of the wound become extremely painful and swollen, and render it necessary to remove them.

When the operation is completed, the parts should be covered with pledgets of lint, strips of adhesive plaster, or a uniting bandage, according as circumstances may indicate.

When the adhesion of the lips of the wound takes place without any unpleasant occurrence, the ligatures should be removed between the third and fifth day, by cutting the loops and pulling at the knot. In withdrawing them, care should be taken to support the lips of the wound by means of the thumb and index-finger of the left hand. After the removal of the ligatures, it will generally be prudent, and in fact sometimes indispensably necessary, to keep the parts for some days more in a proper position and support them with a uniting bandage, in order to avoid rupturing the cicatrix.

QUILLED SUTURE.

This is merely the interrupted suture, with this difference, that the needle must be armed with a double ligature, and that the ends of it are to be tied over two quills, or pieces of bougie, which are to be placed along the sides of the wound. In making this suture, the needle should be introduced in the same manner as in the preceding case, and when the proper number of stitches has been taken, the ends of the ligatures should be separated, and tied in a bow in the manner we have already pointed out.

The quilled suture, which was formerly so much employed by surgeons, is at present almost universally rejected as useless or dangerous. Its adop-

* In withdrawing the needle, care should be taken to stretch the integuments with the thumb and index-finger of the left hand.

The principle of immediate reunion is applicable even to wounds in which large portions of the soft parts are almost entirely detached, or are retained merely by a kind of narrow peduncle, and more especially when this peduncle contains the principal blood-vessels and nerves of the parts. In cases of an opposite character, however, this precaution appears to be perfectly useless, though it has been asserted that large portions of the soft parts, when entirely detached, have been successfully reappplied. As a general rule, however, there can be no impropriety in attempting to procure adhesion of soft parts that have been thus separated, especially if they be small and are naturally endowed with a considerable degree of vitality.

As soon as the wound has been carefully examined, its surface, as well as the adjacent parts, should be cleansed with tepid water, and its edges should be approximated, in such a manner that the corresponding laminæ of the different tissues shall be in exact apposition. In bringing the edges into contact, the fingers should be methodically applied upon each side, at some distance from the wound; and when the approximation has been effected, measures should be taken to keep them in this position, until they have grown firmly together. For this purpose, the parts should be put in a proper position, and recourse should be had to the application of a few strips of adhesive plaster, to the uniting bandage, or to sutures, according to circumstances.

A proper position and the uniting bandage are most frequently indicated, either alone, or conjointly with strips of adhesive plaster. With respect to sutures, as they create pain, irritation, and swelling, they should never be employed when the parts can be kept in apposition without them. Yet, in some cases, they are absolutely necessary, and it is admitted by most surgeons, that in wounds of the scalp, the ears, eyelids, nose, lips, the velum pendulum palati, and of the parietes of the abdomen, intestines, and the recto-vaginal septum, it is proper to use them; but, in most cases, they should be aided by means of bandages and a proper position.

SUTURES.

The sutures which are most generally employed at the present day, are the interrupted and quilled. The other varieties will be spoken of in the observations on hare-lip, staphylophory, and wounds of the abdomen.

INTERRUPTED SUTURE.

The wound being cleansed from all coagula of blood, and its sides being brought accurately into contact, the surgeon takes a curved needle, armed with a broad ligature, between his thumb and the next two fingers, and carries it carefully from without inwards to the bottom, and so on from within out-

extremities should be taken into the right hand, and raised perpendicularly to the surface of the wound, taking care to support its edges with the thumb and fore-finger of the left hand, in order to prevent the rupture of the cicatrix.

When the bandage, adhesive plaster, and other dressings, have become hard and dry, and glued together, and to the surrounding skin, by blood, or other discharge from the wound, the surgeon should soften and loosen the applications by wetting them a sufficient length of time with warm water, which is to be pressed out of a sponge upon them, a basin being held below the part for the reception of the water as it falls off the dressings. This duty is of much importance in saving the patient from a great deal of agony, which the abrupt removal of the adherent dressings would produce.

In large wounds, especially, only one strip, or at most two, should be off the injury at a time; and the part from which the plaster has been removed, having been carefully wiped with a sponge and dried, is then to be supported with a fresh strip, before any more strips are taken off. As Dr. Thomson well observes, it is from inattention to this rule that wounds are daily torn open at each dressing, merely by the weight of the parts which have just been united.—See *Cooper's First Lines*, Vol. 1.

If the wound be very large, or so deep-seated as to interfere with the muscles; if its edges are loose, but have a firm attachment; and if at the same time the wound be situated upon a region or part of the body that admits of the application of a roller, as the chest or one of the extremities, we should by all means have recourse to a uniting bandage, the shape of which must vary according to the situation and extent of the wound, compared with the axis of the extremity or the muscular fibres of the part.

The composition which is commonly used in England for making adhesive plaster, consists of equal parts of the *emplastrum plumbi*, and of the *emplastrum resinæ*.—In this country, especially in Philadelphia and Baltimore, surgeons are generally in the habit of using Mr. Perkins's adhesive plaster, which is put up in the form of rolls, and requires to be spread upon linen previously to its being used. The plaster of Mr. Perkins possesses superior adhesive qualities, and is particularly convenient for country practitioners from the manner in which it is put up.

UNITING BANDAGE FOR LONGITUDINAL WOUNDS.

Apparatus.—The apparatus which is required in the application of the uniting bandage, consists of two graduated compresses, of a thickness proportioned to the depth of the wound, and of a length equal to the width of the bandage; and of a roller of sufficient width to cover the wound, and long enough to pass three or four times round the part. The end of this roller should be split into several strips of about one inch in width. These strips ought to be sufficiently long to embrace three-fourths or four-fifths of the circumference of the chest, or the limb to which the bandage is intended to be applied: and at some distance from the place where they terminate,

tion was violently reprobated by Dionis, the celebrated French surgeon, in his work on Operative Surgery, published at Paris in 1707; and at present it is regarded by some of the English writers "as an artifice of mere ingenuity, and no real utility." In this country it is seldom, if ever, employed.

ADHESIVE PLASTER.

If the wound, whatever may be its form and size, is superficial, and the adjacent skin is endowed with much contractility or a great degree of elasticity; or if the wound is seated upon some particular part of the body, which does not admit of the application of the uniting bandage, its lips should be kept in contact by means of strips of adhesive plaster. The size of these strips must be regulated by the extent of the wound, the separation of its edges, and the difficulty of bringing them in apposition.

Previously to applying them, the wound should be carefully cleansed, and the adjacent parts shaved and wiped perfectly dry, in order that they may adhere with more firmness. The parts are then to be put in a proper position, and the edges of the wound are to be brought into contact and maintained by an assistant. Having done this, the surgeon takes the two ends of the strip, which is to be previously warmed, between the thumb and index finger of each hand, and applies one of them upon the firmest edge of the wound, in such a manner that the plaster shall be in a direction exactly perpendicular to that of the solution of continuity. This extremity ought then to be pressed upon the parts by an assistant, while the surgeon approximates the opposite lip of the wound, and applies the other extremity of the strip. In this manner, a sufficient number of strips is to be applied, taking care to leave an interspace between every two of them, for the purpose of giving exit to any fluid that may escape after the dressings have been applied.

In simple incised wounds, this interspace should generally be from four to five lines; but in very large wounds it will sometimes be necessary that it should be an inch in extent, especially if there be reason to apprehend a considerable discharge of fluids.

After the application of the plasters, the parts should be covered with dry lint and compresses, and maintained by means of a proper bandage. The parts should be kept in the most favourable position for the approximation of the edges of the wound, and the patient should be requested to observe the most perfect rest.

In about four or five days the plasters may generally be removed. For this purpose, the parts should be carefully supported by an assistant, while the surgeon takes one of the extremities of the plaster, and draws it gently in a direction towards the edge of the wound. As soon as this extremity has been loosened to within five or six lines of the wound, the other should be detached to the same extent; and then both

III.—Having arrived there, the head of the spiral roller is to be given to an assistant, while the surgeon turns the superior extremity of the perforated fillet from above downwards, and applies the graduated compresses along each side of the wound.

IV.—The tailed-bandage is now to be placed upon the limb, and its different slips are to be carried over the wound to the distance of about three-fourths of their length, and passed through the slits in the perforated fillet. This bandage is to be secured by a few turns of the spiral roller, and its extremities are to be folded over the wound in the same manner as those of the perforated fillet. The head of the roller is to be again given to an assistant, while the surgeon takes the free and interlaced extremities of the two fillets, and draws them in opposite directions, in order to approximate the edges of the wound. As soon as these are brought into contact, the ends of the fillet are to be placed along the limb, and held firmly by an assistant until the surgeon has covered them completely with the remainder of the spiral bandage.

If there be reason to apprehend that the bandage will not be sufficient to prevent the separation of the lips of the wound during the movements of the patient, it will be advisable to support the limb by means of a splint.

When the wound is so deeply seated as to interfere with the muscles and tendons, most of the means which have just been described, will generally prove useless, unless they are at the same time aided by such a position of the limb, as to keep the skin, cellular tissue, and muscles in a proper degree of tension or relaxation, for maintaining the lips of the wound in apposition.

This position of the parts must always be regulated by the circumstances of the case. Thus, if the wound extend in the direction of the muscular fibres, the part should always be put in an inverse situation to that which is given to it by the contraction of the injured muscles; if, on the contrary, the wound be transverse, the position of the limb should be the same as the action of the muscles has a tendency to produce. Finally, in cases of oblique wounds, the limb should be put in an intermediate position between the two preceding, approaching, however, a little nearer to that which is to be observed in transverse wounds.

After the lips of the wound have been carefully approximated, and means have been taken to keep them in apposition, the surgeon has nothing to do but to wait for their adhesion, and watch the process of the cicatrization, in order to prevent any occurrence that may have a tendency to interrupt it. The healing process is generally rapid, when there is no untoward circumstance, either general or local, to arrest its progress. Three days in young subjects, and from three to five in adults, are usually sufficient for the cicatrization of a wound. In cases of moderate solutions of continuity, in fact, reunion has sometimes been known to take place in forty-eight hours, and in

should be made an equal number of longitudinal slits, from three to four inches in length.

Application.—The parts being put in a proper position, and held by a few assistants, and covered, if it be one of the extremities, with the spiral bandage from below upwards as far as the wound, in order to prevent engorgement, the surgeon applies the part of the bandage which is comprised between the strips and the slits, on the side diametrically opposite the wound. The obvious reason for so doing is to prevent a farther separation of the lips of the wound, which would otherwise be apt to take place. The ends of the bandage are then to be brought over the solution of continuity, where the strips are to be drawn through their corresponding slits. Having done this, the surgeon, holding the strips and the head of the bandage in his left hand, places the two graduated compresses along the sides of the wound, and then draws the head of the bandage and the strips in an opposite direction, and with sufficient force to compress and approximate the compresses. The tapes are then to be carried round the part, and secured by the circular turns of the rest of the bandage.

In some instances, the spiral bandage rolled into a single head, will answer the same purpose as the one we have just described.

UNITING BANDAGE FOR TRANSVERSE WOUNDS.*

Apparatus.—The apparatus necessary for dressing transverse wounds, consists of two graduated compresses, two pieces of cloth, of a width proportioned to the length of the wound, and a little more than one yard long; and of a single-headed roller, made of a fillet eight yards long, and about an inch and a half broad. One of the first two fillets is to be split as far as its middle into a number of small tapes, while the other is to have a corresponding number of longitudinal slits, to enable the surgeon to draw the lips of the wound together.

Application.—I. When the bandage is intended for the leg or arm, the parts below the wound should always be previously covered with the single-headed roller, or spiral bandage, in order to prevent engorgement.

II.—Having done this, the surgeon takes the perforated fillet, and places it along the side of the wound, in such a manner that its imperforated extremity shall pass a few inches over the last turn of the spiral bandage, and that its holes shall cover the wound. The fillet is then to be fixed by means of two or three circular turns at some distance from its inferior extremity, which is now to be turned up, and secured by the spiral bandage, carried to within a short distance from the wound.

* This bandage is likewise applicable in cases of transverse ruptures of the olecranon, patella and tendo-achillis.

and local means, which must be regulated by the nature and circumstances of the case.

Local means.—First dressing.—When the adjacent parts have been carefully cleansed and deprived of hair, the next indication is to apply a thin piece of lead,* or several pledgets of fine lint upon the surface of the wound, in such a manner as to form a thick soft layer, which is to be covered with a few compresses, and the whole secured by means of a moderately tight bandage. If the wound be large, but superficial, it will be necessary to cover it immediately with a piece of fine cloth, spread with a little fresh cerate, and pierced by a large number of foramina. This cloth, which permits the matter to be readily discharged, prevents the lint from adhering to the lips of the wound, and renders the dressings less painful and more expeditious, as it enables the surgeon to remove the lint en masse. When the dressings are applied, the parts should be put in a proper position, in order that the patient may keep them on for a considerable time without pain or inconvenience.

The parts are to be left in this condition for a few days until the lint and the rest of the dressings, which have become hard and agglutinated by the blood which escaped from the solution of continuity, are sufficiently softened by the purulent serosity which soon oozes from every part of the wound, to be removed without pain or difficulty. If, however, the apparatus soon becomes moistened with a great quantity of altered blood and serosity, and emits a fetid smell, the dressings should be speedily renewed; as well as when they are so tight as to produce severe pain and swelling of the parts. Under this circumstance, however, the pain may sometimes be allayed by wetting the dressings with a decoction of some emollient or anodyne substances.

When, on the other hand, the wound is already in a state of suppuration, the second, as well as the subsequent dressings, should be removed about every twenty-four hours.

In all recent wounds, however, as a general rule, the dressings should never be removed, in young subjects, until the end of the third or fourth day, and in old individuals, and in the winter season, never until the fifth or sixth. In taking off the dressings, the surgeon should take care: 1st. That the affected part be held in the same situation in which it was during the application of the apparatus, or at all events that it be placed in such a manner as not to be deranged during the dressing; 2ndly, That the dressings, if they are agglutinated together, be moistened with warm water; 3rdly, That the bandage be rolled up as fast as it is untied; 4thly, That the compresses be removed without the lint, which is to be seized with a pair of dressing-forceps, or cut away with the scissors; and lastly, That the edges of the wound be carefully cleaned with a piece of fine cloth or a sponge and warm water, and that its

* See the treatment of varicose ulcers.

the course of three days, in the large wound which is made in the operation of amputation.

The general indications which are presented in the treatment of a simple wound, are, to prevent the separation of its edges, to preserve them from the contact of air and irritating substances, and to prevent them from becoming so much inflamed as to give rise to suppuration. All these indications are to be fulfilled by proper bandages, low diet, the employment of blood-letting and the usual antiphlogistic means.

SECTION II.

SUPPURATING WOUNDS.

If, instead of an immediate re-union, a wound becomes exquisitely painful, red, and inflamed, it loses its character as a simple wound, and its edges are no longer capable of being united by union of the first intention. In this circumstance, it is to be considered and treated as a suppurating wound.

The fundamental indication which is to be fulfilled in cases of suppurating wounds, is to confine the inflammatory process which invades their edges within proper bounds.

The surgeon may be convinced that the inflammation is moderate and of such a nature as to produce cicatrization, when the surface of the wound is every where covered with firm cellulo-vascular granulations, of a vermilion red colour, and of a middle size, and when the pus which is discharged is thick, white, inodorous, and proportioned in quantity to the extent of the solution of continuity. If, on the other hand, the inflammation be too intense, the surface of the wound will be studded with large, soft cellulo-vascular granulations, its edges will be red, swollen, and painful, and the pus will be scanty, and of a sanious, reddish, or grayish appearance. Finally, when the inflammation is below the type which is necessary for the cicatrization of the wound, the discharge will be extremely profuse, and of a serous nature, and the granulations will be soft, pale, insensible and œdematous.

In the first case, all that is to be done, is to put the part in a proper position, to keep the edges of the wound slightly approximated, by means of adhesive plasters, or a proper bandage, and to cover them with dry lint and compresses. In the second, recourse should be had to emollient applications or the antiphlogistic method of treatment; and in the third, the surface of the wound should be stimulated by pledgets of styrax, or basilicon ointment, astringent decoctions, sweet wine, or any similar substance, at the same time that we prescribe an analeptic regimen and tonic drinks.

The treatment of suppurating wounds consists of general

either by applying pledgets of lint soaked in barley-water, sweet wine, or some astringent decoction, or by touching them gently and repeatedly with the nitrate of silver.

B.—If, instead of continuing its progress, the healing process is arrested, we should by all means endeavour to ascertain the cause of this occurrence, which is frequently owing to a bad regimen; and, if this is found to be the case, it should be carefully regulated according to the age, state and constitution of the patient.

C.—If a bad regimen, however, be not the cause of the obstacle to the cicatrization, it will probably be owing either to an improper application of the dressings, or to a peculiarity of constitution. It should not be forgotten, also, that some pathological conditions of the system, such as scurvy, scrofula, syphilis and herpes, may sometimes keep up a suppuration of the wound, and give it an unnatural appearance. Under these circumstances, the internal cause should be speedily remedied by constitutional means, at the same time that we resort to proper local applications.

D.—If the wound be attended with considerable loss of substance, and is slow in healing, nothing will be necessary but to continue the simple dressings, and give the edges of the wound time to become approximated.

E.—If the wound be situated where the cellular tissue has been destroyed by suppuration, and its edges can not be brought in apposition and maintained in contact, these inconveniences should be speedily remedied in the manner we shall point out in the observations on ulcers, fistulæ, complicated wounds, and purulent abscesses.

General means.—After the dressings have been carefully applied, particular attention should be paid to the state of the system, in order to enable it to keep up the moderate degree of inflammation in the wound, which is necessary for its speedy cicatrization. For this purpose the patient should be kept on a proper diet, drink plentifully of diluent drinks; and, if he suffer much pain or insomnolency, it should be remedied by anodyne preparations. If, towards the third or fourth day, the period for the development of the inflammatory process, the symptoms are very intense, and there is reason to apprehend that the adhesion of the sides of the wound will be retarded, recourse should be had immediately to the antiphlogistic treatment.

The low diet and the usual antiphlogistic means should be continued until the inflammatory symptoms have completely subsided: after which the patient should be permitted to take nourishing broths or panado, and gradually more substantial food; taking care, however, not to give him more than is necessary to repair the waste which is occasioned by the suppuration. By allowing too great a quantity of food, or food of a very stimulating nature, the patient will be liable to gastro-intestinal inflammation, to a plethoric state of the system,

or at all events to a disposition to corpulency, which has been regarded by practitioners as an obstacle to the cicatrization of the wound by preventing its edges from contracting.

SECTION III.

COMPLICATED WOUNDS.

A wound may be complicated with primitive or consecutive accidents. The first are, hemorrhage, pain, tetanus, and inflammation and its consequences. The second are, the separation of the skin and the muscles, the formation of sinuses or purulent abscesses, the suppression of the suppuration, fungous granulations, hospital gangrene, and various other alterations.

A.—*Hemorrhage*.—As a general observation, it may be stated, that every wound, especially when it is made with a sharp cutting instrument, is invariably accompanied with a more or less considerable degree of hemorrhage. When the divided vessels are quite small, the bleeding soon spontaneously ceases, and no surgical interference will be necessary. If the vessels, however, be of a considerable size, the hemorrhage will require particular attention, and should be speedily checked in the manner we shall presently point out.

When the bleeding proceeds from several vessels of a moderate size, which may be readily known by the full stream of blood, as well as from a knowledge of the anatomy of the parts, and their situation is favourable for compression, it is frequently advisable to bring the lips of the wound into contact, to cover them with compresses and a roller, and to request an intelligent assistant to watch the patient. These simple precautions are often sufficient for arresting the bleeding, even when it is profuse. If, however, the hemorrhage does not cease, and the dressings soon become wet, the wound should be immediately uncovered, in order to ascertain the number, size, and situation of the injured vessels, and to arrest the bleeding either by means of compression, cauterization, or the ligature, according as circumstances may indicate.—*See page 12 and seq.*

When the blood flows in jets, is of a beautiful red colour, and large in quantity, the surgeon may be assured that it is furnished by an artery or a large vein, and should by no means hope for a spontaneous cessation of the bleeding; but proceed immediately to the application of the ligature, as the surest and most efficacious means of arresting it.* If the surgeon, however, has not at hand the necessary instruments for performing this operation, he should by all means, until he is

* See page 13.

able to procure them, apply pressure upon the mouth of the vessel, or, if this be impracticable, over the course of the vascular trunk itself. — *See the article on compression, p. 12.*

If the hemorrhage proceed from a small artery, which is so much embedded amongst the soft parts that it can not be effectually compressed or seized with the forceps in order to be tied, as is exemplified in injuries of the sublingual artery, the only chance of arresting the bleeding is to cauterize the orifice of the vessel with the hot iron: for under these circumstances, astringent, styptic and absorbent applications, are seldom, if ever, useful. — For a farther account of this subject, the reader is referred to the treatment of the diseases of particular regions.

B. — Pain, which is always the inevitable result of the action of a vulnerating body upon the living system, is merely an object of secondary consideration, and requires particular attention only when it has acquired a certain degree of intensity. Thus, when the pain is very severe, it should be allayed as speedily as possible: the means which are employed for this purpose, are as various as the causes by which it is produced. The pain which accompanies active inflammation should be combated by antiphlogistic measures; that which results from an imperfect division of a nervous filament, requires a complete division with the knife or caustic, and the simultaneous employment of emollient, relaxing, or anodyne applications. In case, however, it is owing to neither of these causes, we should ascertain whether the wound contains any foreign substance, coagula of blood, or an irritating fluid coming from some cavity or excretory duct; or whether the pain is not kept up in consequence of the clumsy application of the dressings. When the cause of this symptom remains unknown, or if, notwithstanding its removal, the patient continues to suffer, recourse should be had to anodyne preparations, internally or externally applied, with the precaution to discontinue their use as soon as the pain has subsided.

C. — *Inflammation.* — As soon as the inflammation which is developed in the wound, has passed beyond the limits which are necessary for the formation of laudable pus, and is accompanied with fever, the first and most important indication is to remove the cause of the occurrence; and, if this be owing to an inflammatory diathesis of the system, it should be combated by a more or less energetic antiphlogistic treatment. If, on the contrary, it is developed under the influence of a purely local cause, as the exposure of the wound to cold air, the contact of irritating substances, the pressure of the bandages, the unfavourable position of the injured part, the contusion, puncture, or laceration of the nervous filaments, &c., we should speedily remove the cause, and resort to the local and general antiphlogistic means which are commonly employed in the treatment of inflammation.

D. — *Purulent sinuses.* — This peculiar condition of wounds

and certain abscesses, which some writers have designated under the name of cutaneous ulcer, should be speedily remedied, because, being ordinarily favoured by the disposition of the parts in which it is developed, it has a constant tendency to increase, and is sometimes accompanied by very severe constitutional disturbance, in consequence of the absorption of the matter. The existence of this unpleasant complication may be suspected when the suppuration is so profuse as to be entirely disproportioned to the apparent extent of the wound or of the purulent abscess. Under these circumstances, we should endeavour to ascertain, by means of the probe or finger, whether the pus has really destroyed the adjacent cellular tissue, and has burrowed amongst the substance of the parts; so as to form what is called a purulent sinus. If this is actually found to be the case, we should carefully examine the course and situation of the sinus, with regard to the external orifice, and prevent the farther accumulation of the matter by a careful opening and the subsequent approximation of the parietes of the sinus.

If the wound be so large and deep-seated that the matter is confined to its bottom and can not escape, the evil may frequently be remedied by putting the parts in a favourable position, in order to enable the pus to flow with facility and present no impediment to the approximation and adhesion of the parietes of the abscess. In some instances, however, this can not be effected, and it will then be necessary to remove the matter by frequent dressings, taking care each time to cleanse the bottom of the wound with dossils of fine lint, until there is an evident diminution in the discharge.

When the matter is accumulated in a deep-seated cavity, which communicates with the wound only by a very narrow orifice, it will be indispensably necessary to dilate this by a sufficiently large incision to enable the surgeon to introduce, during the first few dressings, a soft piece of lint, in order to absorb the pus, and to serve, according to the expression of Quesnay, to close up the bottom of the sinus, as far as the opening of the wound. In some instances, however, it will be better to leave the orifice untouched, and to make a counter-opening in the most dependent part of the abscess. This counter-opening should be large enough to admit of the introduction of a few dossils of lint, or a raveled piece of linen.

When neither the enlargement of the orifice of the abscess, nor the establishment of a counter-opening is practicable, all that can be done, is to endeavour to produce the adhesion of its parietes by making permanent compression upon its most deep-seated part by means of an expellent bandage, which must vary according to the disposition of the parts. A simple roller, a few ordinary or graduated compresses, and a few pledgets of lint are generally sufficient for this purpose. At the same time that we employ the expellent bandage, we should make use at each dressing of more or less stimulating

injections, in order to induce adhesive inflammation between the parietes of the abscess.

As the accumulation of pus in the cavity of a wound, is not only apt sometimes to produce an extension of the abscess, but also an absorption of the purulent matter, diarrhœa, hectic fever and various other dangerous complications, it is extremely important that it should be remedied as early as possible. For this purpose, the surgeon should employ, in addition to the local measures which have been already recommended, proper constitutional remedies, such as tonic and anti-scorbutic medicines, a nourishing diet, wine, &c.

If, notwithstanding the employment of these means, the symptoms still continue, the life of the patient can only be expected to be saved by amputation, provided this be practicable.

E.—Suppression of the suppuration.—The suppression of the suppuration, which should by no means be confounded with the diminution of the suppuration caused by the inflammation of the edges of the wound, is not, properly speaking, a disease which requires any particular treatment; but rather the result of a more or less severe internal affection. When this accident takes place, it should only, therefore, be an object of secondary consideration, while the various symptoms which accompany it and are indicative of the nature of the disease, should be analysed with the most careful attention. This disease is almost always an inflammation of the brain, the lungs, stomach, intestines, or of some other no less important organ. If the surgeon is fortunate enough to distinguish and combat it with success, the secretion of the pus will soon spontaneously reappear, without the aid of local applications. Sometimes, however, it is necessary to aid the general treatment by the application of irritants to the edges of the wound; though this is done rather to produce a favourable change in the principal affection, than to remove the dryness of the solution of continuity.

The surgeon should not forget, also, that the suppression of the suppuration is generally owing to the patient's regimen or to severe moral impressions; and that the best means of remedying it, consists in the use of a proper diet, and in keeping the mind and body perfectly at rest.

F.—Tetanus.—This complication, which so often proves fatal, is frequently caused by the sudden application of cold and moisture to the body while it is very warm, and by the sudden vicissitudes of heat and cold. It is also produced by deep moral impressions, by the presence of worms in the intestines, and by punctures, lacerations, or contusions, especially when they occur in the extremities or along the course of the large nerves. The nature of the disease is still involved in obscurity, and its treatment is perfectly empirical.

It is impossible, in the present state of our knowledge, to lay down any rational and general plan of treatment for tetanus;

and all that can be done, is to point out the various means that have been most successful, leaving it to the judicious practitioner to employ such as appear best adapted to the cause and intensity of the disease, the age and constitution of the patient, and the climate and season of the year. It may be stated, however, as a general observation, that, whatever curative means be adopted, the treatment of this disease always requires the greatest activity and perseverance.

Whenever there is reason to apprehend tetanus, we should always endeavour to prevent its development by every means in our power. This may generally be done, even in cases of punctures, lacerations, or other injuries, in robust and very irritable individuals, and in warm weather, by carefully avoiding exposure to sudden vicissitudes of temperature, by protecting the wound constantly from the contact of cold and moisture, by administering consolation and comfort to the patient, by allaying his pain by the exhibition of anodyne preparations, and by combating the inflammatory symptoms by proper antiphlogistic measures.

If, however, notwithstanding every possible precaution, the disease can not be prevented, we should endeavour speedily to arrest its progress by means of proper local and constitutional measures.

Local means.—The amputation of the limb has been recommended by Baron Larrey, Sir James Macgrigor, and Sir Astly Cooper; but experience has fully shown that the operation can only be useful in cases of chronic or incipient tetanus. Some practitioners, especially Abernethy and Boyer, regard the operation even as useless or dangerous. In the treatment of this disease, Larrey has likewise recommended to destroy the communication between the sensorium and the nerves of the part by incisions. These should be made before inflammation has come on, and in such a manner that they shall comprehend all the nervous filaments and membranous parts; taking care, however, not to extend them into the joints, which, according to this celebrated surgeon, would exasperate the symptoms of the disease. In some instances, instead of dividing the nerves, equal benefit may be derived from cauterizing them with caustic or the hot iron, at the same time that we have recourse to local or general antiphlogistic measures.

As it is generally at the commencement, or during the development of tetanus, that the wound becomes more or less dry, practitioners have recommended the employment of blisters, as near as possible to the wound, or their application, or that of the unguentum lyttæ, to the wound itself. Another means, which has sometimes been employed with success, is the application of pledgets of lint, soaked in the tincture of opium.

Before we conclude these observations upon what may be called the local treatment of tetanus, it need scarcely be remarked, that before using any of these means, the wound

should always be carefully examined and cleansed of extraneous substances.

General treatment.—The principal constitutional remedies which are at present employed in the treatment of tetanus, are narcotic, antispasmodic, and purgative substances; but the difficulty of introducing them into the stomach in consequence of the trismus and difficulty of deglutition, seldom enable us to make use of them. In order to overcome this impediment, and to facilitate the introduction of medicines into the stomach, surgeons have recommended to pass a flexible catheter down the œsophagus through one of the nostrils; but the attempt to do this almost invariably augments the evil and produces such a violent paroxysm of spasm, and sense of suffocation, that it can not be endured. Sometimes, however, the obstacle to the introduction of medicines, arising from the approximation of the jaws, is prevented by the loss of some of the incisor teeth, or in some instances we may adopt the plan of extracting several of them. But even under these circumstances, it would be better to resort to injections. This inconvenience should always be avoided, when the surgeon is called in before the complete closure of the jaws, by placing a piece of cork between the patient's teeth.

Of all the medicines that have ever been employed in the treatment of tetanus, opium has raised the greatest expectations, and has been crowned with most success. But for this purpose, it is absolutely necessary that it should be given during the early stages of the disease; that the doses should be very large, and that they should be frequently repeated, in order that the system may be kept constantly under its influence. Thus, we should always begin with forty or sixty drops of the tincture of opium, and, if the symptoms be severe, and the progress of the disease rapid, it should be repeated every two or three hours, or even every hour, and the dose should be increased at each repetition, until there is an evident abatement of the spasms, and until the skin becomes moist, and the pulse soft and equal, (*Chalmers.*) In this manner, patients with tetanus will bear astonishing doses of opium, being able to take from thirty to forty grains in the twenty-four hours, without any unpleasant narcotic effects. The use of this medicine should be continued until the symptoms have either abated or completely subsided; for, if this precaution be neglected, the disease will soon recover its former intensity. As soon, however, as there is a sensible effect produced in the spasms, the dose should be diminished and given at longer intervals.

Some practitioners are in the habit of exhibiting the opium in combination with camphor, castoreum, assafoetida, digitalis, and especially with large doses of musk; but these medicines are seldom attended with any benefit. The same applies with regard to the administration of sudorifics, and particularly the aqua ammoniæ.

Purgatives, which are generally indicated in the treatment of tetanus, in consequence of the obstinate and almost constant constipation of the bowels, are frequently useful when they are given in adequate doses to produce daily a copious evacuation. Dr. Forbes asserts that, in these cases, a solution of the sulphate of magnesia, in infusion of senna, is found to answer better than any other purgative. Mr. Abernethy recommends, for the same purpose, a combination of calomel and jalap; Mr. S. Cooper, the croton tiglium;* and Hamilton, various purgative substances.

The lactescent and oleaginous baths of the ancients, and the use of the warm bath, which has been recommended by Bajon, and Dr. Chalmers of Charleston, South Carolina, and reprobated by Hillary, De Haen, and many other writers, appear to be more injurious than useful. The cold bath, on the contrary, has been attended with more success, especially in the West Indies, where it is said to be preferred to every other means. The way adopted consists in plunging the patient in cold water, and, if possible, in that of the sea; or else in throwing from a certain height several pails of cold water over his body. When this has been done, he should be wiped perfectly dry, and be put to bed, and take from twenty to thirty drops of laudanum. The symptoms usually appear to abate, in some measure, but as the relief which the patient experiences is merely temporary, the same treatment should be repeated every few hours, until there is a more permanent remission. In some instances, it will be advisable to aid the good effects of the foregoing means, by the exhibition of wine and bark. It may be well to observe, however, that the action of the cold bath, according to the observations of Hippocrates, Cullen, Callissen, Larrey, and Mr. S. Cooper, is not so favourable in the traumatic, as in the idiopathic tetanus; though many practitioners, especially Heurteloup, and Sir James Macgrigor, have related examples of the good effects of this plan of treatment.

Another remedy, which has been resorted to in the treatment of this disease, is mercury. It has been more particularly employed in France; but it should only be used in cases of chronic tetanus. It is generally applied in the form of frictions, and these should be made so as to produce a quick affection of the mouth. Two or three ounces of the mercurial ointment should be rubbed in at each application; and its effects should be aided by the exhibition of opium, the use of baths, laxatives, and diluent drinks, and it should be continued until the symptoms have completely subsided, or until there is an evident alleviation of the spasms. It should be observed, however, that this remedy is frequently inefficient,

* For an account of the effects and mode of administering this medicine, the reader is requested to consult our memoir upon the purgative properties of the Croton tiglium oil.

and that in cases of acute tetanus, it appears even to aggravate the symptoms.

Although most of the remedies that have been recommended in the treatment of tetanus belong to the class of stimulants, many practitioners put the greatest confidence in the efficacy of the application of leeches along the spine, as well as in general bleeding, when it is practised at the commencement of the disease, in plethoric individuals, and when the wound is in a state of severe inflammation.

SECTION IV.

INCISED WOUNDS.

As the observations which have already been made upon wounds in general, are perfectly applicable to incised wounds, we shall forbear saying any thing farther upon the subject.

SECTION V.

PUNCTURED WOUNDS.

Punctured wounds are often attended with disagreeable consequences when they extend to a considerable depth, and the danger which accompanies them is not merely owing to the fact that the vulnerating instrument generally penetrates deep into the substance of the parts, so as to interfere with large blood-vessels and nerves, or whereby important cavities and organs are frequently injured, but also to the manner in which the tissues are divided, and the rough violence which they have sustained. The most simple punctured wound that can possibly be imagined, is one which is entirely unaccompanied with injury of important organs, and in which the extraneous body has been withdrawn at the moment the wound was inflicted. It may justly be compared to a contused and lacerated wound; it differs from the contusion and laceration of the soft parts merely inasmuch as the external orifice of the injury is small and contracted, and that it extends to a greater depth. The treatment, in fact, is perfectly similar in both cases, being confined to the employment of such means as have a tendency to arrest or prevent the inflammation of the parts.

It may be stated here, as a general rule, that, whenever the surgeon is called in to a patient who has received a wound

from a narrow-pointed instrument, such as a sword, bayonet, or sabre, the first object which should be attended to, is to examine the wound, and ascertain whether it be simple or complicated. If there be a copious discharge of blood, the vessel from which it proceeds should be immediately sought for, and the hemorrhage arrested by the means which are usually resorted to in such cases. When there is reason to suspect that the point of the instrument or any other extraneous body remains in the wound, it should be carefully examined with the finger or probe, and extracted before the parts become swollen and inflamed. Before the surgeon proceeds, however, to examine the wound, he should carefully ascertain whether any important vessels have been injured; though this is not always easy to be done, from the fact that the hemorrhage from a wounded artery may be completely arrested by the presence of a coagulum of blood between the lips of the wound. The existence of this circumstance may generally be inferred, when there is a considerable flow of blood at the moment the injury is inflicted, and when it gradually diminishes and is at length completely arrested: our diagnosis may also be aided by an examination of the point of the instrument, and the direction in which it entered. In such cases, the expulsion of the extraneous substance should be left to the operations of nature, or its extraction should be attempted only after the formation of a complete cicatrix. Until this has taken place, we should carefully guard against hemorrhage. An intelligent assistant, therefore, should watch the patient, and have every thing at hand that may be necessary in case there should be a return of the bleeding.

When the puncture has been made amongst the soft parts which are largely supplied with nerves, and the pain and inflammation are extremely intense, the wound should be carefully enlarged by means of a proper incision, in order to ascertain the nature and extent of the disorder, and to enable the surgeon completely to divide the injured nerves, and extract the foreign body, if it still remain in the cavity of the wound. By the adoption of this plan, the formation of large and troublesome sub-aponeurotic abscesses, may be happily prevented, as well as the unpleasant symptoms which accompany the imperfect division of the nerves, and the strangulation of the inflamed soft parts.

In speaking of the treatment of punctured wounds, Mr. Cooper observes, "I believe, that the application of superficial dressings and cold washes is the best practice for the first twenty-four hours after the receipt of a punctured wound. But if after this period the pain should increase, and the swelling and tension become more and more considerable, the surgeon may then remove the linen and bandages, and apply from six to a dozen leeches to the neighbourhood of the wound. He may also substitute for the cold lotions the use of fomentations and emollient poultices, under which is to be laid over the orifice of the wound a small pledget of spermaceti cerate, or other simple ointment. The poultices and fomentations are to be renewed twice a day, and the leeches repeated, if thought necessary."

SECTION VI.

CONTUSED AND LACERATED WOUNDS.

These two species of wounds, in which the tissues, instead of being divided by a sharp cutting instrument, are torn asunder by a considerable degree of violence, are generally of a disagreeable nature, though their treatment does not essentially differ from that of incised, simple, or complicated wounds. Hence, after having carefully cleansed the parts, and arrested the hemorrhage, the lips of these wounds are generally brought into contact, in order to unite them by union of the first intention. When the sides of the wound, however, are severely bruised or completely disorganized, this union can not be attempted; and it will then be necessary to remove them, and dress the parts like a common suppurating wound.

It should always be borne in mind, that, in contused and lacerated wounds, the pain is in an inverse ratio to the cause of the accident; being generally severe when the wound is only moderate, while, on the other hand, the patient scarcely experiences the least pain, when the injury has been so great as to produce a destruction in the organization of the parts. In severe cases of contused and lacerated wounds, there is frequently no bleeding at all, at the moment of the reception of the accident, although large arteries may have been injured, and afterwards give rise to obstinate and more or less dangerous hemorrhage. In these cases, it may be stated, as a general rule, that, whenever there is reason to apprehend that a large vessel has been wounded, means should always be taken to arrest the effusion of blood as soon as it makes its appearance. Fortunately these precautions are seldom necessary, even where they appear to be more particularly indicated; for numerous examples are on record where whole limbs have been torn off, without the least hemorrhage, or any unpleasant occurrence.

The slight effusion of blood which usually takes place in lacerated wounds, is owing to the severe and extensive laceration of the blood-vessels and adjacent soft parts, which enables the blood immediately to form coagula, so as to close up the mouths of the divided vessels, and save the unhappy sufferer from a speedy dissolution. A few years before I commenced the study of medicine, I saw a man who had his arm suddenly torn off by being entangled in the wheel of a common grist-mill. A very slight degree of hemorrhage ensued, but this ceased spontaneously before the arrival of the surgeon. The patient, although his sufferings were extremely severe, at length perfectly recovered, and is, I believe, still living.

A case somewhat similar to the one just mentioned, has lately occurred in the state of Vermont, and has been related by Professor Mussey. The arm and shoulder were completely severed from the body; but, notwithstanding this, there was but a very trifling effusion of blood, nor did there follow any secondary hemorrhage, although no ligatures were employed.

In dressing contused and lacerated wounds, great care should be taken, especially in the latter, that the strips of adhesive plaster, or the bandage be not drawn too tightly, and that the sides of the wound be only slightly approximated, in order that the inflammation which must necessarily ensue, may take place without strangulating the soft parts. So important is this rule, that whenever it is possible, no adhesive plaster should be used, but the parts should be put in the most favourable position, and maintained by a loose retentive bandage.

In these species of wounds, blood-letting and the usual antiphlogistic means, should always be put in practice, in order to prevent the mortification of the contused and lacerated parts, which frequently happens when this precaution is neglected. It is advisable, also, in many instances, to apply leeches to the adjacent parts, in order to remove local engorgement.

When the contusion and laceration are so severe, that there is no hope of effecting union by the first intention, the afflux of blood to the parts should be prevented by light dressings, and applying cold washes for the first forty-eight hours. If after this, however, the pain still continues, the wound should be covered with emollient poultices, in order to allay the local inflammation, to promote the separation of the disorganized parts, and favour the development of healthy granulations. As soon as the parts begin to cicatrize, they should be dressed like a common suppurating wound.

Some contused and lacerated wounds would be inevitably followed by a rapid mortification of the limb, and the patient run the greatest risk of losing his life, were amputation not performed immediately after the receipt of the injury. These are generally examples, in which the soft parts are extensively and deeply wounded, and large blood-vessels and nerves also injured. When mortification attacks patients so circumstanced, it is the gangrene which Larrey has called traumatic, and in which he and some modern surgeons conceive that amputation may often be done with success, though the mortification has not ceased to spread at the time of the operation. This practice had also its advocates in former days; but, since the time of Messrs. Sharp and Pott, the rule of never attempting amputation, before a line of separation has begun to form between the dead and the living parts, has been taught in every school and implicitly followed by every practitioner.—*S. Cooper, op. cit.*

SECTION V.

GUN-SHOT WOUNDS.

Gun-shot wounds always partake of the nature of contused wounds, and are in most cases complicated with foreign bodies. The treatment of contused wounds, therefore, although applicable in a general point of view, to cases of gun-shot wounds, requires important modifications, in consequence of the extent

of the latter, the nature of the projectile or other body with which it is inflicted, and the shock which the patient experiences at the moment of the reception of the wound, in the injured part or throughout the whole body. When this shock pervades the whole system, it is manifested by extremely various phenomena, which may easily lead the inexperienced practitioner into error, by inducing him to promise too much in the prognosis which he makes. Thus, a slight wound will sometimes produce a sudden alteration of the countenance, vomiting, profuse perspiration, an involuntary discharge of the alvine excretions, mental agitation, tremour of the extremities, syncope, convulsions, hiccough, and other symptoms; while at other times, none of these accidents will occur, or the patient may merely have a slight degree of stupor, and a general tremour, which will readily yield to the employment of a few drops of wine or brandy. This circumstance proves how extremely cautious we should be with regard to the prognosis of gun-shot wounds, when the symptoms do not correspond with the danger of the injury. In order to avoid mistakes of this nature we shall point out the most common cases in which they may be committed.

In many cases of gun-shot wounds, in which the ball has penetrated an extremely vascular part of the body, alarming hemorrhage will be the immediate consequence, while in other cases, in which a large vessel has been injured, there will scarcely be any effusion of blood whatever, or at all events not until some time after the occurrence of the accident.

In some instances, a ball will lacerate the muscles, and fracture the bones, without producing the least solution of continuity of the integuments. This phenomenon, which was formerly attributed to the action of the wind of the ball, may probably be ascribed to the great laxity of the skin, and to the sloping direction in which the ball strikes the surface of the body, so as to be reflected.

When there is only one aperture, and the ball is lodged in the cavity of the wound, it will sometimes heal without any unpleasant occurrence, while in cases where there are two apertures, and the foreign body has escaped, disagreeable consequences will frequently result, either on account of the injury of the bones, which gives rise to abscesses, and fistulæ; or on account of the laceration of the parietes of the arteries, so as to give rise to hemorrhage and the formation of aneurisms.

In some cases, the wound, which at first appears to be extremely simple, and in the most favourable condition for cicatrization, will become complicated with inflammation and supuration of some of the vital organs, especially the liver or the lungs.

The state of insensibility of the surface of the wound may sometimes give rise to the belief that there is a loss of sensation, or mortification of some important organ, when this is really not the case. Or the mortification of the contused parts,

and the loss of sensibility by which it is accompanied, may disable the surgeon from perceiving the nature and extent of the mischief, and induce him to neglect the proper precautions which are necessary to prevent hemorrhage, and other unpleasant consequences.

When there is only one aperture, the surgeon has reason to conclude that the ball has lodged in the cavity of the wound, or that it has carried a piece of shirt or any other part of the patient's dress with it into the wound, without passing through the linen, and may be drawn out in dressing the parts.

When, on the contrary, there are several apertures, we have a right to infer that the ball has passed out; yet each of them may have been occasioned by some particular projectile body, which may still be lodged.

The difficulty of perceiving the degree of danger of gun-shot wounds and of preventing their unpleasant consequences, as well as the fear of the numerous accidents with which they are accompanied, more especially on account of their partaking of the nature of contused wounds, have induced practitioners to change them into simple wounds by means of the knife, in order to augment the chances of effecting a cure. The most proper means for ensuring success, is the amputation of the limb above the wound.

Before the surgeon, however, decides upon the propriety of this operation, he should carefully examine the extent of the wound, its state of simplicity or complication, the nature of the injured organs, the constitution of the patient, his state of health or disease, and inquire into the possibility or impossibility of procuring good accommodations, rest, attendance, and pure air. As a general observation, it may be stated, that the operation may be performed in cases of severe injury of some important blood-vessels or nerves, accompanied with fractures of the bones, especially near their articular extremities, with an almost entire separation of the limb, or the loss of heat and sensibility in the injured parts and a variety of other complications. On the contrary, amputation should never be performed, at least not immediately, if it has been ascertained by a careful examination that there is any hope of saving the limb. In these cases it will only be necessary, without placing too much confidence in the resources of nature, to reflect upon the great number of successful cases that have been recorded in the annals of surgery, to be convinced that recoveries from gun-shot wounds are not so unfrequent as has been generally supposed by practitioners. When the wound is small, and unaccompanied by any serious complications, amputation will not be only unnecessary, but highly improper. The same observation holds good when the patient is so pusillanimous or nervous, that the surgeon has a right to conclude that he will be unable to bear the pain and the shock which must necessarily result from the operation.

If there is every reason to believe that amputation is unne-

cessary, the wound should be carefully dressed according to the rules which we shall now proceed to lay down.

I.—*Examination of the state of the parts.*—This examination is intended to enable the surgeon to ascertain the nature and extent of the wound, and whether it contains any extraneous substance.

II.—*Hemorrhage.*—When there is hemorrhage, it should be immediately arrested by compressing the principal artery by means of the tourniquet or fingers, until the surgeon may be prepared to tie the vessel. Direct compression, however, though generally extremely dangerous, can sometimes alone be resorted to in cases of hemorrhage from gun-shot wounds. The manner of applying it has been already pointed out in the preceding parts of this work.

III.—*Dilating the wound.*—The operation of dilating the wound should be performed immediately after the suppression of the hemorrhage. It consists in enlarging the orifices of the wound by several incisions, in order, 1st, To produce a local disorgement, and prevent the severe inflammatory swelling and strangulation of the soft parts; 2ndly, To change, as it were, a contused into a simple incised wound; and lastly, To enable the surgeon to find and extract the foreign body. These incisions, however, should never be made indiscriminately, but only when they appear to be absolutely requisite; for, by neglecting this precaution, they must frequently prove injurious, not merely because they inflict unnecessary pain upon the patient, but because they give rise to an inflammation, which, in conjunction with that which must necessarily be occasioned by the wound itself, will greatly augment the violence and danger of the affection.—*Hunter.*

Some surgeons have made it a general rule, to dilate gun-shot wounds that are situated in the immediate vicinity of ligamentous fibres and fasciæ, more especially when they contain speculæ of bone or other extraneous substances, which can not be extracted on account of the narrowness of the orifice. The same observation applies in cases of severe pain and inflammation, which obstinately resist the employment of the ordinary antiphlogistic means, and appear to be owing to the tension and confinement of the soft parts; or when the orifice of the wound is so small as to render it impossible to tie the divided vessels.

In dilating a gun-shot wound, the surgeon should first introduce a grooved director, in order that it may serve as a guide to the bistoury with which he designs to enlarge the orifice of the wound, so as to admit of the introduction of the finger. A straight blunt-pointed bistoury is then to be conducted upon the fore-finger of the left hand, and carried into the wound. With this instrument the orifice is to be sufficiently dilated in a longitudinal direction, until the surgeon is enabled to accomplish his wishes. When the parts are very muscular and bound down by strong fasciæ, they should be

freely dilated; but, in this respect, no general rules can be laid down.

When a ball has passed completely through a limb, it will be necessary to dilate both apertures, and, if they are but a short distance from each other, and no important organ intervenes, it may be proper even to convert them into one.

IV.—*Search for the foreign body.*—When the wound has been dilated to a sufficient extent, we should next search for foreign bodies which are almost invariably present in these species of wounds. These bodies commonly consist of pieces of clothes, or other substances, which the ball has driven into the wound, the ball itself, or loose splintered portions of bone.

After having taken every possible precaution for the purpose of elucidating the diagnosis with regard to this subject, we should endeavour, before we make any farther search, to ascertain, whether, as frequently happens, the vulnerating body may not have escaped, and be perhaps found in the patient's shirt or in some other part of his clothes.

When there is reason to believe that some foreign body is contained in the wound, the injured part should be placed, as much as possible, in the position in which it was at the moment of the reception of the accident. If, notwithstanding this, the foreign body can not be found, there will be reason to conclude that it has taken a more or less tortuous course, which should be made as short and accessible as possible, by changing the position of the limb; at the same time that we carefully examine the adjacent parts, and press upon the side diametrically opposite the wound. If all this, however, is insufficient, a finger or flexible probe should be introduced into the wound, and carried in every direction, taking care at the same time to apply pressure to the surrounding parts.

V.—*Extraction of the foreign body.*—If, by a mild and careful examination, the foreign body has been discovered, it will be necessary, before an attempt be made to extract it, to ascertain its relative situation with respect to the bones or soft parts, its size and form, and consequently what kind of instruments are required for its extraction; in what direction they are to be introduced; whether it be necessary to make any counter-openings and dilatations, and, if so, what parts must necessarily be interfered with; and whether it would not be better to leave the foreign body in the wound. It should always be remembered that the manœuvres which are required in the extraction of a bullet, frequently give rise to severe pain and irritation; that they are often useless, especially when the projectile body is firmly embedded in a bone, or lodged beneath a strong fascia, tendon or ligament; and that there is sometimes less risk in leaving it in the wound, than in the attempt to remove it. In many cases, indeed, the ball, or other extraneous bodies, are discharged spontaneously, after the separation of the slough, or they remain in the wound for an indefinite length of time without any unpleasant occurrence. As

a general rule, therefore, the surgeon should always defer the extraction of the ball when it has taken a tortuous route and can not be perceived with the finger or probe. The advantage resulting from this delay is, that the operation, if it should become necessary, may be performed with more facility after the inflammation has subsided. But, notwithstanding this, when the ball is lodged superficially, and can be easily found, it should always be extracted before the inflammatory swelling supervenes.

When the wound contains more than one ball, the most superficial, or that which occasions the most severe symptoms, should be extracted first. In performing the operation, the surgeon should always, if possible, use the finger, which has the advantage of creating less irritation and of being attended with more certainty than any other instrument. In some instances, however, it will be necessary to resort to the forceps or bullet-drawers.

A ball, like every other foreign body, may be withdrawn, either through the wound, or through a counter-opening. But, in all cases, if possible, it should be extracted through the shortest route.

A counter-opening is necessary when the wound is so deep and tortuous, that the foreign body can not be seized with the instrument, or when it is surrounded by such important organs that the wound can not be dilated without great danger of injuring the adjacent parts, and when at the same time the ball is lodged at the opposite side, or at some distance from the wound, and the integuments are so much contused that it can not be perceived, and are in danger of sloughing.

In every case, however, in which the ball can not be easily discovered, or is lodged at the distance of from two to three inches from the surface of the body, and there is danger that the introduction of the instrument will be attended with injury to some important organ, the surgeon may safely abandon all painful and irritating examinations.

The manner of making the counter-opening must be regulated by the situation of the foreign body. If it be situated immediately under the integuments, we should cut down upon it and make a sufficiently large incision to admit of its easy extraction; if it be deep-seated, however, it will be necessary to extend the integuments with the thumb and fore-finger, and to make a perpendicular incision through the skin and subjacent tissues, until we have found the foreign body which it is intended to extract.

After having made the necessary dilatations or counter-openings, the part should be put in the same situation in which it was at the time of the reception of the injury, or in any other position that may seem best calculated to facilitate the extraction of the foreign body.

If the ball be deeply seated, it should be extracted with the fingers or a pair of forceps; but if this be impracticable, and the

ball lies loose in the cavity of the wound, it will be advisable to remove it with the spoon-shaped bullet-drawers, which are to be introduced into the wound upon the left index-finger, which should be used at the same time to assist in the extraction of the foreign body.

When the ball can not be removed with the finger, and is firmly wedged in the bottom of the wound, it should be extracted with the spoon-shaped elevator, or bullet-forceps of Baron Percy. In using this instrument, it should be carried upon the foreign body, and as soon as it has arrived there, its handles should be gently separated, and the ball taken hold of without including any of the adjacent parts, and be withdrawn by moving the instrument from side to side. When the ball is loose, it may be brought between the blades of the forceps by pressing against the opposite side of the limb. In some cases in which the wound is very deep and narrow, and can not be dilated, or in which the ball is in danger of falling into a joint, or some other natural cavity, and of occasioning serious inconvenience, it will be necessary to introduce the blades separately, and lock them as soon as the ball has been firmly grasped.

When the foreign body consists of a piece of cloth, or wadding, &c. it should be extracted in the same manner as a bullet; but more attention will be required on account of the difficulty of distinguishing its fragments, which are frequently so firmly agglutinated to the parietes of the wound, as to become perfectly indistinct.

If there be any portions or spiculæ of bone which are perfectly loose, they should likewise be removed with the forceps, but those which are still adherent, should be left in the wound.

When the ball has penetrated into the substance of the bone, it must necessarily be extracted, because it is almost impossible that it should remain there without producing caries or necrosis. For this purpose, the surgeon should use an elevator or pair of forceps; but should the attempt fail, it will be necessary to resort to the bullet-screw, provided it be a leaden ball. In using this instrument, it should be introduced into the bottom of the wound, upon the index-finger of the left hand, and screwed into the foreign body. All this is easy when the ball is composed of lead, and retains its original shape; but when it has become flattened, as it not unfrequently happens in these cases, the opening which it makes into the bone will by no means correspond with its size; and it will then become necessary to enlarge the bony orifice. This may be done, either with the crown of a trephine, or with a trephine perforator, with which the opening is to be sufficiently enlarged to admit of the introduction of a lever, with the view of extracting the foreign body.

VI.—*Dressings for gun-shot wounds.*—Having fulfilled the indications alluded to in the preceding pages, the surgeon

is next to proceed to dress the wound and take such measures as shall insure the recovery of his patient. After the extraction of the foreign bodies, the treatment of gun-shot wounds differs but little from that of other species of wounds. The first dressing consists in applying pledgets of soft lint and compresses, soaked in cold water, or a solution of the acetate of lead, and in securing them with a loose bandage. The observations of Guthrie, Treille, and others, have proved, that a decided preference is to be given to the use of cold water, for the first two or three days. If this application, however, give rise to disagreeable painful feelings, it will be necessary to substitute emollient poultices or fomentations; and, as soon as the inflammatory symptoms have subsided, the parts should be dressed like a common suppurating wound.

Gun-shot, like contused wounds, are extremely liable to inflammation, and require therefore a more or less energetic antiphlogistic method of treatment. It is particularly necessary to guard against hemorrhage, which is most apt to take place about the ninth or tenth day, the time when the slough separates. Until this period, therefore, the patient should be carefully watched, in order that the bleeding may be speedily arrested, not only when it results from an injury of one of the principal arteries, but likewise when it makes its appearance under the form of a sero-sanguineous oozing from the whole surface of the wound. In the first case, which may speedily terminate the patient's existence, it will be necessary to secure the injured vessel with the ligature; and in the second, which, though less prompt in its effects, is equally dangerous, recourse should be had to the application of a decoction of bark, in combination with the hydro-chloric acid, and to the exhibition of the sulphate of quinine, and small doses of diluted sulphuric acid.—*Richter*.

The general treatment to which we have just alluded, is applicable to most cases of gun-shot wounds; but it is by no means sufficient when they become complicated with hospital gangrene, tetanus, caries, necrosis, and other dangerous and unpleasant affections. Under these circumstances in fact the case must be treated according to the nature of the symptoms, and the species of complication; and, when the case is very severe, the only hope of saving the patient is the amputation of the limb, which, though not invariably successful, should always be resorted to in cases of the following nature:

I.—When the wound, instead of progressing rapidly towards cicatrization, undergoes a protracted suppuration and discharges unhealthy pus; when the fractured bones remain disunited and are constantly bathed with matter; and when, at the same time, there are symptoms of hectic fever, which are rapidly undermining the constitution of the patient, and threaten him with a speedy dissolution.

II.—When, in consequence of severe inflammation of the parts, gangrene has supervened, and the constitution of the

patient is in such a condition as to be able to bear the shock of the operation. In this case, amputation should be performed above the mortified part, before the appearance of the reddish inflammatory circle which indicates the commencement of the separation of the dead from the living parts.—*Larrey*.

III.—When there are symptoms of chronic tetanus (*Boyer—Larrey*); but in this the operation should be performed during the intermission of the exacerbations of the disease. The same means has been employed in the incipient stage of acute tetanus, but the results have been so variable and unsatisfactory that the operation can not be recommended as preferable to the measures which are in general use.

When amputation is deemed indispensably necessary, it should be determined whether it will be proper to perform it immediately, or to wait until the first symptoms of the injury have subsided.

It may be stated, as a general rule, that, when the necessity of amputation is decided upon, it should be performed within the first four and twenty hours, or before the development of inflammation. This point of surgery, which was formerly a subject of much dispute, is now put beyond the possibility of a doubt. In some cases, however, which we shall presently point out, it will not only be proper, but absolutely necessary to delay the operation.

Great advantages result from the performance of the operation during the first two or three hours after the reception of the injury, and after the cessation of the faintness, great depression or agitation of the system, which usually arise from the physical commotion which takes place at the moment of the receipt of the wound, or from the great alarm of the patient. By immediate amputation, we prevent many of the inconveniences which are attached to the conveyance of the wounded in military wagons; and diminish the dangers of a long residence in a hospital, by converting a contused and complicated wound into one which is capable of being speedily healed. By this means, also, the patient has the advantage, that, in case he is left on the field of battle, and can not receive immediate attention, his wound may remain several days without being dressed, and that the dressings can afterwards be changed with much greater facility and less pain.

The propriety of immediate amputation in cases of gun-shot wounds of the extremities, has been inculcated by the authority of the most eminent military surgeons that have adorned the records of our science since the dawn of the seventeenth century to the present day. Without citing the names of all the advocates of distinguished talents and celebrity that have espoused the necessity of the immediate, or very early performance of the operation, suffice it to mention those of Du Chesne, Wiseman, Le Dran, Ranby, La Martinière, Schmucker, Larrey, Hennen, Thomson, Hutchinson, Cooper, and Guthrie. The great body of evidence that has been adduced in favour of immediate amputation, by some of these writers, especially by the celebrated Larrey, who followed the destinies of Napoleon in his diversified campaigns, and whose situation at the head of the medical department of the

French army afforded him unparalleled opportunities of judging from actual experience, will perhaps forever preponderate over that of delay.

Fortunately it matters little at present what are the opinions of American surgeons upon this subject; but, when our country shall be again invaded by foreign foes, or if it should ever be threatened with civil commotion, it will not only be an interesting, but a highly important subject for discussion.

CASES DEMANDING IMMEDIATE AMPUTATION.

I.—When a limb has been carried away by a cannon-ball, or the explosion of a howitzer or bomb, the operation should be immediately performed; for, if this be neglected, the surgeon will be obliged to make large and painful incisions, for the shortening of projecting muscles and tendons, the extraction of spiculæ of bone or other foreign bodies, and the discharge of abscesses. If the operation be not speedily done, there will be frightful hemorrhage, a kind of torpor or primitive mortification resulting from the shattered condition of the bones and the great laceration of the soft parts, or from the violent commotion of the limb; and afterwards excessive inflammation and gangrene, or a protracted suppuration.

II.—When the bones have been smashed into pieces, and the soft parts violently contused, lacerated, and deeply torn away, amputation should be immediately performed. If this be neglected, violent inflammation and gangrene will be the inevitable consequences.

III.—When a great mass of the soft parts, and the principal vessels of the limb have been carried away, without fracturing the bone, or when a cannon-ball has destroyed the principal artery and vein of the thigh, and has at the same time injured the os femoris, amputation should be speedily performed.

“An injury of the femoral artery, observes Mr. Guthrie, requiring an operation, accompanied with fracture of the bone of the most simple kind, is a proper case for immediate amputation; for, although many patients would recover from either accident alone, none would, I believe, surmount the two united, and the higher the accident is in the thigh, the more imperious is the necessity for amputation.”—*Guthrie on Gun-Shot Wounds*, p. 187.

IV.—Immediate amputation is required, when the principal nerve of a limb has been destroyed by a grape-shot or the explosion of a howitzer, without, however, touching the main artery.

V.—When there is what has been improperly called a wind-contusion, or, in more correct language, a severe rupture and laceration of the muscles, tendons, vessels, aponeuroses, and bones, without a solution of continuity in the skin. In this case, however, the operation should by no means be performed, until the surgeon has ascertained the extent of the disorder. For this purpose, he should not be guided merely by the want of motion and sensibility of the limb, and the extensive swelling and deep-seated fluctuation which characterize

the effusion of blood; but he should make a free incision through the skin, in order to ascertain, as nearly as possible, the extent of the mischief. By this means, even if the operation should not be necessary, the surgeon fulfils an urgent indication, by giving vent to a quantity of thick blackish blood.

VI.—When the articular extremities of the bones are much shattered, especially those which form the joints of the knee, foot, or elbow, and the ligaments, by which these articulations are strengthened, are extensively broken and lacerated, by a grape-shot or other kind of ball, the operation should be immediately performed. The same observation holds good, when the bullet has lodged in the substance of the articular head of a bone, or when it is so engaged in the joint, as not to admit of being extracted.

The unfortunate consequences which almost invariably result from a shattered condition of the articular heads of the bones, particularly from those which form the knee, ankle, or elbow, accompanied with great laceration of the ligaments, have induced some of the most eminent modern military surgeons, especially Larrey, Hennen, and Guthrie, to lay it down as a general rule, always to amputate on the field of battle, unless the patient is obviously sinking.

VII.—When a biscayen, a piece of bomb-shell, or a small cannon-ball, in passing through a limb, as the leg, for instance, has extensively denuded the bone, without fracturing it, amputation is likewise required, although the soft parts may not appear to have suffered any severe injury. In these circumstances, recourse should be had speedily to the operation, especially if the injured limb be cold and insensible; if the integuments, and even the periosteum are extensively detached from the bone; if there be a general disorder of the functions of the body, and all the secretions experience a considerable disturbance; if the intellectual faculties are suspended, the circulation retarded, the pulse small and concentrated, the countenance pale, and the eyes have a dull moist appearance; and if, in fine, the patient feels such a degree of anxiety, that he can not long remain in one posture, and requests that his leg may be quickly taken off, as it incommodes him severely, and he experiences excessive pain in the knee. When all these characteristic symptoms are conjoined, it is obvious, says Baron Larrey, that the violent concussion produced by the accident, has shattered and disorganized all the parts, and that, if amputation be delayed, the leg will speedily be attacked with sphacelus, and the patient certainly perish.

VIII.—Immediate amputation is deemed necessary, when a large joint, such as the elbow, or knee, has been extensively opened, and blood is extravasated in the articulation. In these cases, acute pain and inflammation, abscesses, caries, deep sinuses, hectic fever, and death, must be the inevitable consequences, if the operation be neglected.

IX.—Immediate amputation is likewise urgently required,

in cases of compound fractures of the thigh from gun-shot violence, more especially if the fracture occur above the middle of the os femoris. Numerous observations prove that these species of wounds can seldom be cured without amputation; and it has been asserted by highly respectable authority, that not more than one-sixth usually recover so as to have useful limbs.

The writings of military surgeons contain but few histories of cases, in which the thigh bone had been fractured above its middle by the passage of musket bullets. These are cases, I believe, which have generally had a fatal termination; and the danger, attendant upon the amputation, which they require, seems long to have deterred surgeons from attempting to ascertain what advantages might be derived from the employment of the operation. Schmucker recommends, and states, that he had practised with success, immediate amputation in those cases, in which a sufficient space was left below the groin for the application of the tourniquet. It is curious to remark in the history of amputation, how long surgeons were in discovering the ease and safety with which the femoral artery may be compressed by the fingers, or pads, in its passage over the brim of the pelvis. Boy, from the immediate danger, protracted suffering, and ultimate want of success, which he had observed to follow this kind of injury, urges strenuously the propriety of immediate amputation: Mr. Guthrie's opinion, with regard to the dangerous nature of these injuries, and the advantages to be derived in them from immediate amputation, coincides in every respect, with those of Schmucker and Boy. He observes, that those whose thigh bone has been fractured in its upper part by a musket bullet, generally die with great suffering, before the end of the sixth or eighth week; and that few even of those escape, in whom that bone has been fractured in its middle part. Of the few, whom we saw, who had survived gun-shot fractures in the upper part of the thigh-bone in Belgium, scarcely any one could be said to be in a favourable condition. In all, the limbs were much contracted, distorted, and swollen, and abscesses had formed around and in the neighbourhood.—*Thomson's Reports*, p. 257—258.

If none of the circumstances above alluded to be present, and the wound is attended with less danger, we should endeavour to save the limb, without having recourse to amputation. The foreign bodies should therefore be extracted, and the parts dressed in the manner we have already pointed out in the preceding pages. If the wound gradually gets well, nothing will be necessary but to continue the same measures; if, on the contrary, there supervene such complications as to interrupt the process of the cicatrization, we should hasten, either in the hope of saving the life of the patient, or of curing him without a painful and disagreeable deformity, to have recourse to consecutive amputation.

If, in cases of severe gun-shot wounds, accompanied with injury of the bone, for instance, there is reason to conclude that the limb may be preserved, the first indication to be fulfilled is to enlarge the orifice of the wound by free incisions, in order to extract the foreign bodies, and the loose fragments of bone. When this has been done, the orifices of the wound should be carefully examined, to ascertain whether they are

sufficiently large to admit of the free discharge of matter, spiculæ of bones or other extraneous substances, that could not be extracted; and, if this is found not to be the case, it will be necessary to make one or two incisions in the most dependent part of the wound. When the parts have been perfectly cleaned, the limb should be placed in a fracture-box, the bones should be reduced, and the wound should be covered with soft lint, compresses dipped in cold water, or a solution of the acetate of lead, and a light bandage. The rest of the treatment is the same as in every complicated wound.

Such are the means which are applicable to the different cases of gun-shot wounds, particularly to those of the extremities. The treatment of those which occur in the head, chest, and other regions of the body, has some peculiarities, which we shall now proceed to point out.

GUN-SHOT WOUNDS OF THE HEAD.

If a ball, in striking against the head, has glided under the integuments, and can be felt at some distance from the place where it entered, or diametrically opposite, it should be brought fairly into view by means of a crucial incision, and extracted. It sometimes happens, that a ball breaks the external table of the skull, so that the course which it takes shall contain numerous spiculæ of bone. In cases of this description, the course of the fracture should be exposed by a free incision, and the splintered fragments carefully extracted.

When the fracture of the bones of the skull is accompanied with symptoms of cerebral compression, recourse should be had immediately to the application of the trephine, in order to take away such pieces of bone as require removal, and to let out any extravasated blood.

If a ball be lodged in the substance of the bone, in such a manner that only a portion of its diameter is free, it should be removed with the small extremity of a spatula, which should be made to act like a lever; but if the attempt fail, it will be necessary either to apply the trephine, or to make an opening on the side of the ball, so as to enable the surgeon to introduce a lever, and remove it. In the first case, the trephine is to be applied upon the ball itself, by means of a piece of paste-board, having a rounded hole in its centre, proportioned to the size of the crown of the instrument which it is intended to use, as well as to replace the centre-pin, which can not be employed in cases of this description; while, in the second case, the crown of the trephine is to be applied upon a healthy portion of bone, near to the foreign body.

The application of the trephine is likewise urgently indicated when a ball has pierced the cranium, and appears to be lodged between the parietes of the bony vault and the dura mater. In cases of this nature, it is frequently necessary to

make a number of perforations, on account of the flattened condition of the ball and of its disproportionate dimensions to the diameter of each opening of the instrument.

When a ball has pierced the cranium and dura mater, and has been arrested in the substance of the brain, it should by all means be extracted, provided it be situated so superficially that it may be readily seized with a pair of forceps. In cases of an opposite description, however, it should be left undisturbed, and nothing should be done, but to combat the symptoms to which it may give rise. It need scarcely be added, that, when the ball can be extracted, it will be necessary, previously, to make a sufficiently large opening through the vault of the cranium, in order that it may be taken hold of with facility.—For a farther account of this subject the reader is referred to the article on Wounds of the Head.

By an attentive perusal of the works on surgery, numerous instances will be found, in which patients have lived for a considerable time, with balls lodged in the substance of the brain. For an account of some of the most remarkable cases of this description, the reader may consult the *Mem. de l'Acad. de Chir.*; *Paroissés Opuscles de Chir. Obs.*; *Schmucker's Vermischte Chir. Schriften*; and *Hennen's Military Surgery*.

GUN-SHOT WOUNDS OF THE THORAX.

Although balls and other foreign bodies have sometimes remained for a great number of years in the cavity of the thorax, free from symptoms indicative of their presence (Percy), yet it is always necessary, in a wound of this description, to ascertain whether the projectile body or any other foreign substance may be contained there, and especially whether the ball has penetrated the chest. It should be borne in mind, in these examinations, that appearances may sometimes lead the practitioner into error, and create a belief that the ball has passed through the chest and lungs, when this in fact is not the case. Thus a single aperture is not always indicative that the ball still remains in the wound or has fallen into the cavity of the thorax, because it is possible, as we have already stated, that it may carry with it into the wound a piece of shirt, or some similar substance, without going through it, and when the latter is inadvertently drawn out, the ball is also extracted.

Another source of deception is when a ball glides under the integuments, and after having thus made the circuit of the chest without penetrating into its cavity, lodges either under the skin, the substance of the muscles, between two ribs, or in the substance of one of these bones.

In these dubious cases, it will be necessary, after having ascertained that the foreign body does not remain in the substance of the thoracic parietes, to refrain from probing the wound, which would be apt to produce useless irritation in the parts, to give rise to hemorrhage, or to push the foreign body still farther in. In these cases, nothing should be done,

in fact, but to combat the symptoms as they arise; for it may happen that no important organ has been injured, that the extraneous body may escape spontaneously, or, if it be small, that it may be discharged through the mouth, or remain for a long time in the chest without much inconvenience, or be enclosed in a sero-cellular sort of cyst, so as to be always retained in the same place.

When a ball lodges in one of the intercostal spaces and produces difficulty of respiration, we should endeavour to extract it in a manner best adapted to the circumstances of the case: the means which are required in these cases are so extremely various, that it is impossible to lay down any general rules. If the ball has lodged in the substance of the sternum, it may be removed with the crown of a trephine, or a gouge and mallet.

In a penetrating gun-shot wound of the thorax, the surgeon should extract all extraneous substances, and spiculæ of bone within reach, and apply light unirritating dressings. The next and most important indication is to prevent and subdue the inflammation of the lungs and pleura. This is to be done by the use of blood-letting, and the other ordinary antiphlogistic means.

In order to prevent internal hemorrhage, and save the patient from suffocation, the lancet should be freely and repeatedly employed, and from thirty to forty ounces of blood should be immediately taken after the receipt of the injury. So necessary, indeed, is the lancet in cases of this description, that it has been justly asserted by some of the most respectable writers on military surgery, that it is the only means that can possibly save the life of the patient. After the most urgent symptoms have subsided, and there is less danger of suffocation, the surgeon should prescribe the tincture of digitalis in large doses, so as to moderate the force of the circulation; and if there be much cough, great benefit may be derived from the exhibition of the *spermaceti* mixture in combination with opium. At the same time that these measures are adopted, the patient should be confined to a low diet, drink freely of cold mucilaginous drinks, and have his bowels opened by saline purgatives and mild injections.

When a ball is lodged in the thoracic cavity, it is often productive of so much mischief that it becomes absolutely necessary to extract it, even after it shall have remained for a considerable time. This measure is particularly indicated when the ball gives rise to severe inflammation and suppuration of the pleuræ, to the formation of fistulæ, and general consecutive symptoms. Before, however, an attempt be made to extract it, it is of the utmost importance that we should ascertain its precise situation, which is by no means always an easy matter. In the early stage of the affection, a simple incision through one of the intercostal spaces will often be wide enough; but, at a later period, this space will be too narrow, and it will then be necessary to cut away a portion of the upper edge of the rib with a probe-pointed bistoury. In case the surgeon entertains doubt with regard to the true situation of the ball, and espe-

cially when there is an effusion in the chest, he should make an incision in the most dependent part of the thorax, or in the place where he has a right to suppose that the ball has descended by its weight.

GUN-SHOT WOUNDS OF THE ABDOMEN.

Gun-shot, like all other wounds of the abdomen, may be divided into two kinds; one penetrates the parietes of the belly; the other enters the cavity of the peritoneum, and does mischief to the viscera. They differ from most other wounds, however, in being usually complicated with foreign bodies, which render their treatment somewhat peculiar.

A ball may penetrate into the abdomen, pass completely through it, or even remain there, without its proving necessarily fatal. In these cases, the ball does either not injure any of the viscera, or it glides over the surface of the intestines, without producing any accident but some degree of contusion, or it is moved with so much impetus as to give rise to a slough, which prevents extravasation and enables the parts to become united by adhesive inflammation. We should, therefore, by no means always despair of being able to effect a cure in such wounds, or neglect to make use of proper means. These means, which include none of the mechanical aids of surgery, consist of general and local blood-letting, low diet, rest, and a supine posture.

When a ball has entered the cavity of the abdomen, and is lodged so deeply that it can not be felt with the finger or probe, all attempts at extracting it will be worse than useless, unless it has fallen into the bladder. When the ball, however, has penetrated into the substance of the liver, and is lodged superficially, it may generally be extracted; at all events it will be proper to attempt it.

When a ball has entered the posterior part of the abdomen and has injured the vertebral column, the external wound should be freely dilated in various directions, in order to prevent the tension and constriction to which the parts are so extremely subject, in consequence of their being bound down by thick aponeurotic fasciæ, and in order also to extract the foreign body, which is sometimes the cause of the paralysis which is so frequently observed in cases of this nature. When the ball is lodged between the spinous processes, it may be removed with a pair of forceps; but should the attempts fail, at the same time that the foreign body is embedded in one of the bodies of the vertebræ, recourse should be had to the application of the trephine. After the operation is completed, the parts should be lightly dressed, and such means should be employed as have a tendency to prevent and subdue inflammation.

Wounds of the posterior part of the bladder almost invaria-

bly terminate fatally; while those which take place in such parts of this organ as are not covered with reflections of the peritoneum, generally heal. When a ball has entered the bladder, which may generally be known by a discharge of bloody urine, and the introduction of the catheter, it presents three important indications; one is to prevent the extravasation of urine; the other to extract the ball and other extraneous substances; and the third consists in preventing and subduing the inflammation of the bladder and adjacent parts. The first indication is to be fulfilled by introducing a large gum-elastic catheter, which is to be left in the urethra until the wound has become cicatrized, taking care to withdraw it every four or five days, and pass in a clean one, so that no incrustation may occur. The second is fulfilled by enlarging the external opening, if it be seated above the pubes, and by introducing a pair of forceps in order to extract the foreign body, in the same manner as in the high operation of lithotomy; or by performing the lateral operation, if the wound be situated at any other part of the bladder. Neither of these operations, however, should be performed during the development or existence of the first inflammatory symptoms.

In all cases of gun-shot wounds of the bladder, the patient is to be kept upon a very low diet, and in the most perfect rest. He should be requested to take plentifully of acidulated demulcent drinks; his bowels should be opened by mild laxative injections; and recourse should be had both to local and general bleeding. The parts are to be kept perfectly cleanly, and are to be covered with light and simple dressings.

In case the ball has perforated the rectum, and the urine and fæces are discharged through a fistulous opening, we should endeavour to produce an obliteration of this opening by intercepting the passage of the irritating fluids. For this purpose, it is necessary to use a silver or leaden tube, proportioned to the extent and curvature of the rectum, and long enough to pass beyond the perforated place. This tube should be introduced into the bowel and left there until the wound has completely healed.

If the wound occupy the inferior portion of the rectum, and, especially if it be accompanied with loss of substance, the contraction which must necessarily result, may be prevented by the daily introduction of a large tent of lint, which is to be constantly kept in the bowel until a cure is effected. In both cases, great care should be taken to prevent and subdue the colliquative diarrhœa, which constitutes one of the most frequent and troublesome complications of this unpleasant and dangerous occurrence.

SECTION VIII.

POISONED WOUNDS.

A.—Bite of the Viper and other Venomous Serpents.

Besides the local indications which a poisoned wound furnishes from its participating in the character of a contused and lacerated wound, it presents various others which result from the introduction of a deleterious substance into the bitten part, and from its general effects upon the system. The treatment of the bite of the viper, therefore, is divided into local and general means.

Local treatment.—The local treatment, which should always be resorted to as speedily as possible, consists in disorganizing the bitten part, in order to prevent the local action of the venom, and its entrance into the system. This disorganization is effected by cauterizing the wound; but, in order to be productive of advantage, it is necessary that it should be done immediately after the reception of the injury. The caustics, which have been extolled as specifics in these cases, are potassa (Fontana) and aqua ammoniæ. This remedy was first tried in France in 1747, by Jussieu; and has since been extensively employed in the case before us.* The liquid is to be applied by means of a thin pointed bit of wood which is to be dipped into it, and repeatedly introduced into the bottom of the puncture, made by the fangs of the reptile. The wound should then be covered with a dossil of lint, dipped in the same fluid, and protected with a compress and bandage. After the caustic has produced an eschar, the best application that can possibly be resorted to, is an emollient poultice.

When the accident has happened in a place where these remedies can not be immediately administered, we should endeavour to destroy the virus by carefully washing and dressing the edges of the wound, and prevent its entrance into the system, by the application of a ligature above the tumefied part, in order to impede the capillary circulation, taking care at the same time that the compression shall be so regulated as not to create any danger of gangrenous mischief, by interrupting the circulation in the large vessels. This measure is frequently employed in America, with the view of preventing the venom from being absorbed into the system.

Another method of extracting the poison from the wound, which was already known to the ancients, has lately been recommended by Mr. Barry: this consists in the application of a cupping-glass. Experience, however, it would seem,

* When this remedy can not be obtained, we may use the sulphuric or nitric acid.

has determined little in its favour. In using a cupping-glass, the puncture made by the fangs of the reptile should be previously enlarged, in order to facilitate the extraction of the virus, and the cup should then be applied, and left on for at least two or three hours, taking care to renew its application several times in the twenty-four hours. It will be advisable, also, to promote the action of the instrument by the application of some liquid caustic, or a mixture of oil and ammonia.

The most efficacious method, perhaps, of removing the virus consists in the excision of the bitten part. This operation, however, can only be useful when it is performed at the moment of the reception of the injury, before the development of inflammation. It is a method, likewise, which can not always be put in practice on account of the unwillingness of the patient to submit to the operation, and the inconvenient situation of the bite for the excision of the parts.

When the wound is superficial, the viper small, and benumbed with cold, or little irritated; its poison considerably exhausted by its having previously bitten other animals; the swelling and local symptoms inconsiderable; and the bite has been inflicted in any other month than May or June, nothing will be necessary but to introduce into the wound a few drops of ammonia, or the eau de luce, which differs from the former only in its containing a small quantity of the oleum succinatum, to apply a small compress wet with the same fluid, and to anoint the adjacent parts with olive oil, or any other oleaginous substance, either alone or conjoined with ammonia. In some instances, also, an emollient poultice will be highly beneficial. In case the ammonia can not be obtained, so as to be speedily administered, the bitten parts should be immediately plunged into an oleaginous bath. These means are generally attended with success in the cases to which we have alluded, and they may be employed with so much the more confidence, inasmuch as they never exert any unfavourable influence, and are calculated to raise and support the courage of the unhappy patient, which is an object of no trifling importance.

General treatment.—The general treatment has for its principal object the prevention or destruction of the effects of the poison after its being absorbed into the system, and consists chiefly in the exhibition of sudorific medicines, which are said to be endowed with the power of eliminating this deleterious substance after its entrance into the circulation. Many other remedies, however, have been employed for the same purpose, and under almost all the varieties of applications, very few of the patients have died. Hence, Fontana concluded, that scarcely any of the remedies were productive of beneficial effects; and that the recovery of the patient was rather to be ascribed to the slowness of the accident, than to any specific virtues of the various applications that are employed. Of all the medicines that have been resorted to for the cure of this disease, sudorifics are those which deserve the greatest

confidence, especially the aqua ammoniæ, which, as we have already said, was first tried by Bernard de Jussieu, in the year 1747, upon a medical student, who suffered from the bite of a viper. This medicine is administered, either alone, or in combination with the oleum succinatum, in doses of from ten to fifteen drops, every two hours, in a very strong infusion of warm tea, elder flowers or orange leaves; but for persons of a weak, delicate, or irritable habit, from five to ten drops will generally be sufficient. The patient should be put to bed, and should be well covered and kept in a profuse and continual perspiration, by drinking plentifully of the drink just mentioned. As soon as the symptoms have abated, the dose of the medicine should be gradually diminished, as it will be apt, if too long continued, to produce an unfavourable impression upon the primæ viæ.

In India, another plan of treatment, of which arsenic forms the principal ingredient, has been employed with considerable success after the bite of venomous serpents, and especially of the coluber carinatus of Linnæus. The beneficial effects of this method have been fully confirmed by the experiments of Mr. Ireland, a British army surgeon. On his arrival in the Island of St. Lucia, he learnt that several of the men belonging to the 68th regiment, had died from the bite of the coluber carinatus, and that every thing had been tried by the medical attendants to no purpose. He determined, therefore, to give arsenic a full trial as soon as an opportunity should occur. A case soon came under his own observation, in which, after having put the patient to bed, and dressed the wound, he ordered a cathartic injection, and prescribed the following mixture:

R. Liquor Arsenic.	ʒij
Tinct. Opii.	gtt. x.
Aq. Menth. pip.	ʒss.

which was added to half an ounce of lime juice, and given during its effervescent state. This medicine remained on the patient's stomach, and was repeated every half hour for four successive hours; at the same time that the parts were frequently fomented with common fomentations, and rubbed with a liniment composed of

Ol. Terebinth.	ʒi
Liquor Ammoniæ,	ʒi
Ol. Oliv.	ʒij

The cathartic clyster was twice repeated, and as soon as the patient began to be purged, the arsenical potion was discontinued. By this treatment, the patient became gradually more sensible, and recovered his intellectual faculties; the fomentations and frictions, however, were repeated at proper intervals; and by proper dressings to the parts, and attention to the state of the bowels, the wound soon healed.

A treatment so severe as this, however, is only required in the bites of the most formidable serpents, and can not be necessary in cases of wounds that are inflicted by the venomous reptiles of this country (France.)

When the first symptoms which are caused by the bite of the viper or any other serpent, have abated, the state of the bitten part, and the general disposition of the patient should be carefully examined, and the consecutive treatment should be modified according to the nature of the local and general symptoms.

It is worthy of remark, that the liquor arsenicalis, used by Mr. Ireland, was prepared according to the formula of Dr. Fowler, which contains one grain of arsenic in two drachms of the solution.

B.—BITES OF RABID ANIMALS.

The dangers which result from the bites of a rabid animal, are owing to the absorption of the hydrophobic virus which is deposited with the saliva of the animal upon the surface of the wound. As long as this virus has not entered into the circulation, nounpleasanteffects are to be apprehended, and the surgeon has a right to conclude that the development of hydrophobia may be prevented. When the absorption, however, has taken place, the affection, which has now become general, is beyond the resources of the healing art, and the patient must necessarily perish. All the most powerful medicines of every description have been tried in this horrible disease to no purpose; and experience has fully proved that preservative means can alone be employed with any tolerable success, before rabies is developed.

The preservative treatment has for its principal object the extraction or destruction of the deleterious principle which has been deposited upon the wound, and consists in the extirpation of the bitten part, or in its cauterization by means of the actual or potential cautery.

The excision of the envenomed part, which is preferred by many practitioners, is one of the most certain methods of removing the virus, when the bite is conveniently situated for the operation, and when it is performed very soon after the reception of the injury.

Cases sometimes present themselves, in which it is preferable to amputate the limb, than attempt to prevent the action of the virus by extirpating, either with the knife or cautery, the whole of the bitten parts. The operation should always be performed when the wound is situated in the arm or foot, and the parts are so much disorganized as to be completely disabled from performing their functions, and the bite partakes at once of the nature of a severe contused and lacerated wound; or when the teeth of the animal have penetrated to such a

depth, that the parts can not be cauterized or extirpated without endangering the life of the patient.

Cauterization, which is at present generally preferred in France to excision, may be practised either with some liquid caustic, the moxa, or the hot iron. The actual cautery, however, claims a decided preference, from the fact that it is always at hand and may be quickly employed. This method was already known to the ancient physicians; and, though it is alarming to the patient, it possesses the advantage of being attended with less pain, and of acting with more promptness and certainty, than any other caustic applications.

Before applying the actual or potential cautery, the wound and adjacent parts should always be carefully washed with a view to remove the saliva. These lotions should be made with some warm resolvent fluid, a solution of soap, potash, or muriate of soda; and when the parts have been cleaned, they should be wiped perfectly dry, in order to promote the action of the cautery.

If it be intended to use the potential cautery, a preference should always be given to the liquid chloride of antimony, the efficacy of which, if we are permitted to judge from the observations of others, has been frequently demonstrated. When this remedy, however, can not be obtained, recourse may be had to the caustic potash, the nitrate of silver, or to the sulphuric or nitric acid; though, as we have just said, these substances should only be employed in case the chloride of antimony can not possibly be procured.

Either of these liquids may be applied by means of a small strip of ravelled linen, secured to the end of a small piece of wood. The linen is to be dipped in the fluid and carefully applied to every part of the wound: for it is upon the care with which the cauterization is done, that depends the safety of the patient, since, by neglecting to touch the least possible point, the virus may still exert its unhappy effects. The wound should then be covered with pledgets of lint wet with the same fluid, and a compress is to be applied, and secured by means of a proper bandage. These dressings are to be left on for several hours, until the caustic has produced a pretty deep eschar.

In applying the caustic potash or the nitrate of silver, it should be pulverized and spread upon pledgets of lint, which are to be introduced into the wound and kept there until they have produced a proper slough.

If the wound be large, it will generally be sufficient to apply the caustic in the manner we have just pointed out. In cases of an opposite description, however, it will be necessary to make free incisions, not only to promote the action of the caustic, but to prevent the tension and inflammation which often accompany lacerated wounds. Cases are sometimes presented, in which the wound has either partially or completely healed: under these circumstances it will be necessary to di-

vide the whole of the cicatrix, and allow the wound to bleed before the cautery is applied.

The bite of a rabid animal may be cauterized with tolerable prospect of success, even after the wound shall have completely cicatrized, provided there be no symptoms of hydrophobia. When rabies, however, has become developed, cauterization will not only be useless, but even injurious.

Another method for the prevention of rabies has lately been recommended by Dr. Marochetti, of Moscow, who asserts that he has witnessed its beneficial effects in the experiments of the peasants of the Ukraine, in the year 1823. It consists in daily examining the lower part of the patient's tongue; and, as soon as the two vesicles or *lyses* which are formed in these cases on each side of the frænum linguæ, are observed, they should be opened and cauterized; taking care at the same time to exhibit a strong decoction of the *genista-tinctoria*, and to apply a blister to the wound. As this mode of treatment, however, has not yet been sanctioned by experience, and as the existence of these lysés has been violently disputed, it becomes the prudent and intelligent practitioner, until the method of Marochetti shall have been confirmed by the testimony of others, to put his confidence in the actual or potential cautery, and to resort to its application whenever the nature of the case shall be such as to render it practicable.

The *genista-tinctoria* is recommended to be taken for six weeks, in the quantity of a pound and a half per day, in decoction; or four drachms of the powder, one drachm at a dose. By the use of this medicine, aided by aperients or mild clysters, Marochetti asserts that he has cured a number of cases of hydrophobia, which came under his care while physician to one of the Russian princes.

As all the curative means which have hitherto been employed in cases in which the hydrophobic symptoms had commenced, have been productive of no benefit, it would be perfectly useless to give an account of them on the present occasion; and we shall merely remark in concluding this article, that, although the disease almost invariably baffles every plan of treatment, however well directed, yet we should always endeavour to diminish, as much as possible, the sufferings of the unhappy patient, and religiously protect him during his short but miserable existence. For this purpose, he should be confined in a dark, quiet, and solitary room, and no light or water should be brought near him, the sight of which strikes him with horror. Besides this, he should be treated with the most perfect kindness; his courage should be sustained by flattering him with a speedy recovery; and none but those who wait on him, should be permitted to be in his presence.

The various remedies that have at different times been employed in Europe, in cases of confirmed hydrophobia, though generally with little or no benefit, are emetics, mercury, hydro-cyanic acid, opium, camphor, musk,

ammonia, arsenic, hydro-chloric acid, cantharides, atropa belladonna, the nitrate of silver, bleeding at delirium, tobacco clysters, oil of turpentine, and a host of other equally powerful medicines. In this country, the *scutellaria lateriflora* has lately been recommended and extolled as a certain specific for hydrophobia; but, how far it deserves the character with which it has been dignified, experience, I believe, has not yet determined.—For an account of the use of this plant, the reader is referred to the paper of Dr. L. Spalding, published in New York in 1819.

C.—WOUNDS FROM DISSECTION.

The symptoms which usually arise from the puncture of a scalpel or the point of a tenaculum, depend upon the inoculation of a deleterious substance, with which the point of the instrument is at the time covered. The first indication, therefore, which is to be fulfilled, is to prevent the absorption of this substance, and to convert, as it were, the puncture into a simple wound. For this purpose, the puncture should be exposed, immediately after the receipt of the injury, to a current of water, its edges should be firmly pressed, and after it has been allowed to bleed freely, it should be cauterized, either with a piece of caustic potash, with the nitrate of silver, or the liquid chloride of antimony. When this operation has been properly performed, the wound will speedily heal; but in case this has been neglected or but imperfectly done, it will be necessary to prevent and subdue the local inflammatory symptoms, by the use of proper topical and constitutional remedies. In some instances, however, the disease augments, and is accompanied with evident symptoms of typhoid fever, which is ascribable to the inflammation of the veins extending from the affected limb to those of the trunk. Under these circumstances, it is necessary to pay proper attention to the state of the bowels, and to employ a moderately antiphlogistic method of treatment.

BURNS.

A very high degree of irritation, accompanied sometimes with excessive pain, but proportioned usually to the extent of the injury of the cutaneous texture, is always the immediate and necessary effect of the action of caloric when applied to any part of the body. The fundamental indication, therefore, is the same in all species of burns; and most of the means which have been recommended by authors are intended principally to prevent and subdue the inflammatory symptoms, and to allay the pain and sufferings of the patient. These means, however, require numerous modifications, according to the degree of violence of the burn and the primitive or consecutive accidents with which it may be complicated.

PRIMITIVE TREATMENT.

Local means.—First degree.—If there be merely a redness of the skin, and the surgeon is called in immediately after the receipt of the injury, he should endeavour to prevent inflammation, provided there be neither excoriation or vesication, by the application of a very volatile liquid, such as ether, or alcohol, and by exposing the parts at the same time to a current of air; or, what is still better, by immersing them in spring or ice water, or covering them with compresses wet with the same fluid or a solution of the acetate of lead. These means are to be continued until the pain has completely subsided; but if, notwithstanding these applications, it can not be subdued, and the burn occupies an extensive surface of the integuments, it will be absolutely necessary to have recourse to the administration of opiates, which, under these circumstances, are generally extremely useful. The inflamatory symptoms, which not unfrequently arise in these cases, are to be combated by proper antiphlogistic means.—*See the article on Inflammation.*

In several cases of mild burns that have lately come under my notice, I have derived great benefit by covering the parts with a cabbage leaf, previously softened at the fire. I was first led to the use of this remedy from a knowledge of its beneficial effects after the application of blisters, and feel every confidence, from the few trials which I have made with it, in recommending it to the profession. When applied in this manner, the cabbage leaf speedily allays the disagreeable burning pain of the part, and prevents the development of inflammation. In order to be useful, however, it should never be left on until it has become dry, but should be removed about every two hours, and a fresh one applied.

When the burn is superficial, much advantage may also be derived from the application of raw cotton, vinegar, scraped potatoes or turnips. The cotton should be thinly spread out or carded, and laid directly over the injured part. This remedy promises to be extremely useful in practice, and is at present extensively used in different parts of the United States.

Second degree.—In the second degree, the redness is attended with swelling and excessive pain, and there arise vesicles. Under these circumstances, the parts, as in the preceding case, should be immersed in cold water, exposed to cold air, or covered with wet cloths, and the vesicles should be punctured with a sharp needle, in such a way as to allow the serum to drain off slowly and prevent the air from coming in contact with the inflamed surface of the cutis. This operation should be repeated as often as the vesicles become distended, and each time care should be taken to cover the parts with a piece of soft linen, spread with a small quantity of the saffron or opium ointment, mixed, if thought proper, with a weak solution of the acetate of lead.

Third degree.—In the third degree, the parts are excoriated, the symptomatic fever runs higher, and there is a great degree of pain, accompanied with shiverings. In cases of this description, recourse should likewise be had to the employment

of discutient and sedative applications, especially when the burn is small and is seated in one of the extremities. These means, though they do not, perhaps, as in the preceding cases, completely prevent the development of inflammation, yet they diminish its intensity, and allay the sufferings of the patient, and thus prevent the consecutive gangrenous mischief and its concomitant effects. When they are insufficient, however, they should be speedily removed, and emollient and sedative applications applied in their stead. For this purpose, the parts should be covered with pledgets of lint spread with soft cerate, containing a large proportion of opium and a little acetate of lead. The parts may also be dressed with the chloride of soda, as lately recommended by Professor Lisfranc, who has made some trials with it at the hospital de la Pitié. In using this remedy, the parts are to be covered with a piece of perforated linen, spread with cerate; and upon this is to be applied a sufficient number of thick pledgets of lint, wet with the fluid to which we have just alluded. The pledgets are to be covered with a compress, dipped in the same fluid, and a light bandage. During the intervals of the dressings, great care should be taken to keep the apparatus constantly moist by wetting it several times during the course of the day with the fluid just mentioned. This method, which has been attended with evident advantage in all kinds of burns, should be perseveringly continued, until the parts have perfectly healed.

Baron Larrey's treatment of burns, which he declares to be preferable to every other, especially to the treatment of repellents, consists in dressing the parts with fine old linen, spread with saffron ointment, or honey, provided the former can not be procured. The employment of this ointment is to be continued till suppuration takes place. When this has been established, the separation of the eschars is to be promoted by means of the styrax ointment. When the dead parts have separated, recourse should again be had to the saffron ointment, for which dry lint may gradually be substituted, with strips of linen spread with cerate.

When the parts are so excessively painful that no dressings can be applied, it will be necessary to touch them with a mixture of cerate and opium by means of a very soft pencil; and as soon as they become less tender, the employment of this mixture should be discontinued, and an emollient poultice applied in its stead, more especially if the parts be very red and swollen. These emollient applications have the advantage of moderating the inflammation which always accompanies the separation of the eschars, and of promoting their detachment; but, in some instances, they appear to create a local relaxation, which is particularly manifested by a slowness in the healing process. Under these circumstances, the parts should be covered with pledgets of lint, spread with styrax or basilicon ointment, or soaked in the chloride of soda. They may also be stimulated with astringent washes, such as lime

water, a decoction of oak bark, and a weak solution of the sulphate of copper.

In dressing the parts, great care should always be taken to cause as little irritation and pain as possible; because these would frequently give rise to unpleasant effects, on account of the great degree of nervous irritability of the patient. When the wound is deep-seated, the surgeon should always wait for the spontaneous separation of the eschars, and never cut them away, because it sometimes happens that they contain nerves and blood-vessels, which are still in a healthy condition, and which it would be dangerous to divide.

After the separation of the eschars, the parts should be dressed like a common suppurating wound.

Fourth degree.—In cases of the fourth degree, a great extent of the cutaneous texture is completely disorganized, and the constitutional symptoms are usually very severe. Here the means which have already been recommended for burns of the second and third degrees, are likewise applicable; but, in addition to them, it will be necessary to keep the edges of the wound separated, and to enable the parts to form a new skin. To accomplish this object, the injured part should be put in such a position that the edges of the wound shall be kept in a state of constant separation. When the burn is situated on the back part of the neck or trunk, on the elbow or posterior part of the arm, or the anterior part of the knee, a favourable position will generally be sufficient for this purpose. The same observation holds good when the burn occupies the groin or abdomen, and the lateral parts of the thorax, or the axilla; for in these regions the integuments may be very readily rendered tense without the employment of bandages.

Cases sometimes present themselves, however, in which particular measures become indispensably necessary. Thus, when the burn is situated upon the lateral and anterior parts of the neck, it will be necessary to draw the head towards the opposite side by means of a few leather straps, which are to be fastened round the head on the one hand, by a few turns of a bandage, and, on the other, by means of a roller carried round the body: when it occupies the bend or anterior part of the arm, the limb should be kept permanently extended by means of a splint placed along the back part of the arm and secured firmly at each of its extremities; when it is situated at the hand, the fore-arm should be supported upon a thin pillow and a splint, which should be long enough to pass below the fingers; lastly, when the burn is situated in the palm of the hand or the sides of the fingers, the hand should be placed in a large curved splint, taking care always that the fingers be extended and kept in a state of separation.* This method, however, is not

* The extremity of this splint should be perforated with four or five holes, and through these an equal number of small pieces of tape are to be drawn so as to form a loop for the end of each finger.

sufficient when the skin of the hand has been completely disorganized, especially near the base of the fingers; for it can not prevent the cicatrix which always begins to form at the part just mentioned, and finally unites the fingers together so as to give rise to a shocking and awkward deformity. It is necessary, therefore, in addition to the means which we have just recommended, to make permanent pressure from below upwards, at the angle of the fingers in which the cicatrix usually commences, by applying upon this part the centre of a narrow strip of linen, one end of which is to be carried over the palm of the hand, and the other over its dorsal surface, and both are to be fixed to the wrist by a few turns of a roller.

When the burn has destroyed the circumference of one of the natural orifices of the body, great care should be taken to prevent it from becoming closed, by making permanent pressure upon its edges from within outwards, by means of a dosil of lint or a proper sized gum elastic tube, which should be worn for a long while after the parts have healed, on account of the great tendency of the cicatrices to contract.

In burns of the face, no benefit can be derived from the use of bandages, in consequence of the disposition and mobility of the parts; so that it is always necessary, in order to keep the edges of the wound in a state of separation, to apply strips of adhesive plaster. Plasters, however, are seldom sufficient on account of the impossibility of securing them with any degree of firmness; and in spite of our endeavours, we can scarcely ever prevent the formation of a narrow and deformed cicatrix.

After the separation of the eschars, care should be taken to destroy the large fungous granulations which are frequently developed in these cases, and to which may be attributed the prominent and irregular cicatrices, which remain after burns, by means of the nitrate of silver, the nitrate of antimony, or some other escharotic substance.

Fifth degree.—In the fifth degree, in which not only the muscles, but even the bones are injured, the local treatment must consist of emollient and sedative applications, in order to allay the pain and inflammation, and promote the separation of the eschars. When the dead parts have sloughed off, the cicatrization of the sore should be favoured by rest and a proper position, in such a manner that the injured parts may not become altogether useless to the patient, or give as little trouble as possible.

Sixth degree.—In the sixth degree, in which the limb is almost totally destroyed, nothing can be done but to remove the parts by amputation.

When burns are produced by gun-powder, sulphur, saltpetre, aqua fortis, &c. recourse may be had to the unguentum liq. plumbi acetatis, to a liniment composed of equal proportions of lime-water and linseed oil, or to the following ointment, which has received great celebrity in cases of this description in Germany:

R. Lard,	lb 1.
Oil of Nuts,	lbss.
Deer's Tallow,	lbss.
Marrow,	℥iv.

—Melt, and when perfectly hot, pour the mixture into cold water, and make it into a proper consistence.

General means.—A burn occupying an extensive surface, is invariably followed by general, primitive, or consecutive symptoms, which it is no less important to combat than the local disorder by which they have been produced. Thus, therefore, after having ascertained the extent of the accident, and fulfilled the first indications, careful attention should be bestowed upon the general state of the system.

The danger of burns is always proportioned to the extent and violence of the injury; hence, cases of the first and second descriptions, when they occupy a large extent of surface, are not only dangerous, but sometimes actually fatal from the severe pain and constitutional disturbance to which they frequently give rise. When the patient, therefore, experiences intolerable pain, fever, extreme agitation, and spasms, notwithstanding the employment of proper local remedies, recourse should be had speedily to the antiphlogistic treatment, more especially to general bleeding, which is indispensably necessary, as well as to large doses of opium; but here, as in all other cases of severe inflammation, the anodyne preparations should be administered either conjointly with, or not until after the antiphlogistic remedies. The patient should be put on a low diet until the inflammatory symptoms have greatly abated; but care should be taken not to keep him too low, especially in cases of deep-seated burns, for fear that he will not be able to sustain the loss of fluids which he must necessarily experience during the profuse suppuration and healing of the sore. As soon as the state of the patient will permit, he should take small quantities of light and digestible food; and his bowels should be kept moderately open, by means of laxative or mild cathartic medicines, such as castor oil, or rhubarb.

If, instead of well marked febrile symptoms, there be stupor, a small feeble pulse, coldness of the extremities, and other signs of prostration, we should endeavour to rouse the general sensibility, and to excite the action of the different organs, by wrapping the patient in warm flannels, by applying frictions and administering tonic and stimulant medicines, such as wine, ether, volatile alkali, &c; and when, by these means, the desired reaction has been produced, we should again have recourse to a milder treatment, and even to antiphlogistic means, provided these be required.

It sometimes happens that the surgeon mistakes a high degree of inflammation for real debility, or depression of the vital powers. When this error is discovered, blood-letting and other debilitating means are alone capable of dissipating the dangerous state of the patient, and should therefore be immediately employed.

CONSECUTIVE TREATMENT.

When burns have been improperly treated, or have received no surgical aid, they usually leave some degree of deformity which it is often important to remedy, but which can not be done till several months or years after the parts have become healed, from the danger of a loss of substance of the newly formed integuments, which remain for a long time imperfectly organized, and consequently very brittle. It may be stated, also, as a general observation, that the operation should never be attempted unless there be every reason to suppose that the deformity may be either partially or completely removed, and that the parts may be restored to their former integrity, or at all events rendered more useful.

When the cicatrix is too narrow, it may be remedied, by making incisions in different directions through the substance of the skin and by keeping the edges of the wound thus formed in a state of separation, by means of a proper bandage, and a favourable position.

When the parts do not readily yield to the means which are employed to restore them to their natural condition, it will be better to effect our object by mild and gradual efforts, than by painful and violent measures, which are always productive of mischief. The consecutive treatment in these cases is always the same as in burns after the separation of the eschars.

When the cicatrices are too prominent, they should be removed with a thin, double edged knife, which is to be introduced through their middle, on a level with the surrounding skin, and directed successively towards each of their extremities. The edges of the wound are then to be kept separated by dossils or pledgets of lint, and strips of adhesive plaster; taking care at the same time to repress the fungous granulations, in such a manner that the surface of the wound shall be constantly below the level of the surrounding skin.

In case there are, as not unfrequently happens, preternatural adhesions, it will be necessary to make free incisions, which are to be carried beyond their origin, and to keep the sides of the wounds thus formed in a state of separation, and apply permanent pressure at the place where the cicatrix ought to commence, that is, at the angle of reunion.

Finally, cases are sometimes presented in which there is either a partial or complete closure of a natural orifice. Under these circumstances it will be necessary, after having destroyed the preternatural adhesions by means of a bistoury, to dilate the centre of the wound with a tent of lint or other substance, which is to be worn for a considerable time after the parts are perfectly healed.

ULCERS.

The term ulcer is usually applied by surgeons to the different solutions of continuity of the skin and subjacent parts,

which are attended with a secretion of pus, or some other analogous discharge, and which have no disposition to heal, in consequence of the local or constitutional cause by which they are occasioned.

In the treatment of ulcers, the chief object should be to convert their surface into a simple wound. For this purpose surgeons have recourse to various means; some of which are intended to correct the scrofulous, scorbutic, and syphilitic diatheses of the system; while others act directly upon the surface of the sore, and are necessary for the cure of every kind of ulcer, whether symptomatic, or idiopathic.

Local treatment.—As a general rule, it may be observed, that simple ulcers, such as those which succeed to the removal of a slough, which are observed on the legs of old people and those whose profession obliges them constantly to stand, as well as those which do not appear to proceed from any specific disease, or morbid diathesis existing in the constitution, will almost invariably heal under the influence of the ordinary dressings which are used in cases of suppurating wounds.

The attention of the profession has lately been called to a very ingenious method of dressing ulcers, by M. Reveillé-Parise. This method, which appears to be particularly applicable to the cases just alluded to, consists in the application of a thin piece of polished lead or tin,* which is to be kept on the ulcer by means of a compress and bandage. After it has thus remained on for three or four days, it is to be removed, and the surface of the ulcer is to be gently wiped and its edges cleaned. The lead is then to be reapplied, and removed as occasion may require, until the sore is perfectly healed. Whenever the lead loses its polish, it should either be cleaned, or another applied in its place. By means of these dressings, a simple ulcer always assumes a favourable aspect, and speedily cicatrizes. Lead, however, is not the only substance which may be used for this purpose, for any other metal that does not become easily oxidized will answer perfectly well.

These simple dressings, however, are no longer sufficient when the ulcerated surface presents any of the modifications which have given rise to the numerous species and varieties of ulcers. Under these circumstances it will be necessary to make use of particular methods of treatment, according to the indications of each particular case.

In cases of irritable, vitiated, inflammatory, or gangrenous ulcers, in which the pain and inflammation give rise to severe constitutional symptoms, recourse should be had to a strictly antiphlogistic method of treatment. The part should be covered with light emollient poultices, which are to be employed as the continual application. Much advantage may sometimes be derived from the steam of warm water, either alone or in

* Its thickness varies from one-fifth of a line to a line, and its size is proportioned to the extent of the sore.

combination with some spiritous substance, and from the application of pledgets of lint soaked in a solution of the extract of opium, and spread with simple cerate or any other digestive ointment. When warm applications appear to be injurious, they should be discontinued, and cold ones substituted in their place. In these cases, considerable advantage may be derived from the use of cream, and the application of potato poultices, which keep the parts cool and moist.

Great care should always be taken in dressing an ulcer, that the bandages do not produce the least pressure, and that the limb be kept perfectly quiet and elevated, so as to favour the return of the blood. The use of emollient applications should be continued until healthy granulations appear and the sore begins to heal; after which simple dressings are to be applied, as in cases of common suppurating wounds.

When gangrene supervenes, it is to be combated by different means, according as it may appear to be owing to the violence of the inflammation, or to a morbid diathesis existing in the constitution.—*See the article on Gangrene.*

When an ulcer is surrounded by hard, thick, prominent edges, and the granulations are smooth and glossy, it will be necessary, before any thing can be done with advantage, to remove the cause of its unfavourable appearance, which is owing, most frequently, to the irritation which is daily kept up by an awkward application of the dressings, by the employment of ointment or other irritating substances, by excess in diet, want of rest in the affected part, and to various other causes. When this has been done, we should apply emollient, or stimulating applications, make use of pressure, or touch the ulcer with the nitrate of silver, as circumstances may indicate.

Emollient and sedative applications, either alone or conjoined with local bleeding, are generally capable of removing the hardness and swelling of an indolent ulcer, when the permanent local inflammation which has produced them, retains a considerable degree of violence, but which it is not always an easy matter to distinguish by a mere examination of the parts. When the ulcer is recent and remarkably irritable, the granulations small, firm, and of a very red colour, and the patient young or not enfeebled by want or excess, the means just alluded to should always be employed; but care should be taken that they be not too long continued; for if this precaution be neglected, they will give rise to hard fungous granulations, which can be destroyed only by stimulating applications. Many practitioners, however, and particularly Sir Everard Home, regard the treatment of callous ulcers by emollient applications, as rarely useful, or as being capable of effecting but a temporary and imperfect cure.

When the granulations are soft, smooth, glossy, insensible, and elevated, it will be necessary to have recourse to stimulants, and to compression or cauterization; but before this be done, it will be proper to make use of emollient applications,

in order to soften the granulations and promote the action of the means just mentioned.

The stimulant applications which have been recommended in the treatment of fungous or callous ulcers, are a solution of the argenti nitratum, the tincture of myrrh, a decoction of walnut leaves, diluted nitrous or sulphuric acid, and the unguentum hydrargyri nitrati.

The best caustic applications are the chloride of antimony, Lisfranc's collyrium, and more especially the nitrate of mercury. This last substance has obtained great repute in several of the Parisian hospitals, where its beneficial effects have been confirmed by numerous experiments. According to the memoir of Dr. Paillard, the nitrate of mercury is daily employed at the hospital St. Louis, with the most decided benefit, not only in the cases under consideration, but in a great number of chronic and obstinate affections of the skin.

Compression has been more particularly employed in cases of chronic ulcers of the legs. It may be made by means of a bandage, a laced stocking, or with strips of adhesive plaster, according to the method of Mr. Baynton, of Bristol. This gentleman's method is now generally adopted in England, and its beneficial effects have been fully confirmed by repeated trials. It may be employed in the worst kinds of ulcers of the leg; it allays the pain and irritation of the affected part; prevents the growth of fungous granulations; and has the advantage that it may be used while the patient is pursuing his usual occupation.—We shall again refer to this subject in speaking of the diseases of the extremities.

When an ulcer is seated in an extremity which is œdematous and covered with varices, and has resisted the treatment of simple ulcers, and particularly the employment of thin pieces of lead or tin, or if it has again broken out after it was once healed, we can only expect to cure it by means of a methodic compression of the whole limb.

In many cases large chronic ulcers baffle the most rational treatment, while in others they readily yield to empiric means. As a striking confirmation of this fact, we may instance the use of mercury in cases of ulcers of the instep and foot, which have a very hard, thickened edge, and are attended with a diseased state of the surrounding skin, so as to bear some resemblance to elephantiasis. In cases of this description, great advantage may be derived from a solution of corrosive sublimate, and from fumigations with the hydrargyrus sulphuratus ruber. In some instances, an ointment composed of calomel and hog's lard; in others, the camphorated weak mercurial ointment, will be the best application.

Ulcers sometimes present themselves in which nothing will do good, except hemlock poultices, or lint dipped in a decoction of the herb and applied to the sore. Ulcers of this description usually occur near the ankle or on the sides of the knee, and are accompanied with severe pain, swelling of the

joint, and an enlargement of the adjacent soft parts. They have been suspected to be of a scrofulous nature, but they are more sensible than strumous ulcers generally are.

Other ulcers again, after having resisted our best directed efforts, readily yield to the application of poultices, made of salt water; or under the influence of the salt-water bath, either alone, or diluted with a concentrated decoction of poppy-heads.

Finally, in cases of ulcers of a herpetic nature, in which the sore does not extend deeper than the skin, but spreads in every direction, nothing will be attended with so much benefit as applying to them a solution of the nitrate of silver; and the cases of old fungous ulcers which occur on the legs and baffle every kind of treatment, are most easily cured by the application of pledgets of lint, dipped in a solution of arsenic.

Notwithstanding what has just been stated, the surgeon should never be in too much haste, as is too often the case in the treatment of old ulcers, to have recourse to these irritating applications, especially so long as we are ignorant of their proximate cause, or are unable to account for the general and local symptoms by which they are accompanied. There is no doubt they are sometimes efficacious, but in most cases we may dispense with their employment. This is the case, more especially, when the patient adheres strictly to our prescriptions, and when, by a careful examination, we have discovered the true cause of the obstinacy of the disease; for it will then be found that a local antiphlogistic treatment, and particularly the application of leeches, which are too much neglected in these cases, will often be attended with the most salutary effects.

CHAPTER IV.

OF THE DISEASES OF PARTICULAR REGIONS.

SECTION I.

OF THE DISEASES OF THE HEAD.

a. Injuries of the Cranium.

WOUNDS OF THE HEAD.

A simple wound of the head, by whatever instrument it may be produced, differs in no respect from a wound of the same nature in any other region: it presents, in fact, the same indications, and requires the same mode of treatment, excepting, however, that in wounds of the head it is necessary, on account of the vicinity of the brain, which frequently suffers from the shock of the vulnerating instrument, and on account also of the danger of phlegmonous erysipelas of the scalp, to lay it down as a general rule, which should always be adopted rather as a matter of prudence than of necessity, to have recourse to the antiphlogistic method of treatment, especially to bleeding, and the use of laxatives, and if the wound be deep and narrow, to enlarge it by proper incisions.

The same observations are applicable to wounds of the head, complicated with simple fractures, and with other symptoms, except those arising from injury of the brain itself. This being the case, we shall only treat, on the present occasion, of those wounds of the head which require particular surgical aid, and refer the reader for an account of the others to the article on wounds in general.—Page 105.

The first object of the surgeon, when he is called to a wound of the head, should be to shave the scalp to the whole extent of the injury, or even the whole head, if he has reason to believe that there are several wounds, or a fracture without a division of the soft parts. By adopting this method, he will soon be able to ascertain the nature and seat of the disorder, which, if he pursued an opposite course, could only be detected with great difficulty. In addition to these advantages, he will be able to apply his dressings, as well as such other topical applications as the circumstances of the case may require, with more benefit and facility.

Having made himself acquainted with the nature of the wound, and applied the proper dressings, the surgeon should

next endeavour to combat the symptoms which must necessarily attend the accident, by such means as we shall presently point out, in order that he may be able to prevent the development of inflammation. To effect this highly important object, recourse may be had to the method of Schmucker, which consists in the immediate abstraction of blood, an operation which should be repeated, if the circumstances of the case require it, twice or three times during the first twenty-four hours. Thick linen compresses should then be applied to the parts, having first dipped them in a cold mixture, composed of the following ingredients:

℞ Water,	lbx.
Vinegar,	lbj.
Nitrate of potash,	ʒiij.
Hydro-chlorate of Ammonia,	ʒiv.

These compresses should be renewed every hour, taking care at the same time to administer some aperient drink, in combination with the nitrate of potash, some laxative medicines, such as the neutral salts, and stimulating injections.

Schmucker recommends this treatment not only in wounds attended with simple fracture of the cranium, and symptoms of severe injury of the brain, but in all cases of wounds of the head. In those cases which require the application of the trephine, he prescribes precisely the same means, with the exception of blood-letting, until the patient has perfectly recovered.

Without employing this method in its full extent, we should never neglect the use of blood-letting, either general or local, at the same time that we prescribe the use of laxatives, a solution of tartarized antimony, purgative injections, and sudorific medicines. These means constitute the basis of the general treatment of wounds of the head, and are calculated to prevent or remove the congestions and inflammations of the brain, which are generally the most dangerous and unpleasant consequences of these kinds of wounds.

The local treatment of wounds of the head, complicated with injury of the cranium, or of the brain, varies according to the circumstances of the case, and requires our most serious attention.

If the fracture be not comminuted, or if there be no moveable or displaced fragments of bone, and no symptoms of cerebral affection, it may be regarded as simple, and nothing will be necessary but to unite the wound by the first intention. For it is well known that the fracture itself never constitutes the danger of the wound, or presents any particular indications but the symptoms which accompany it, and which are generally perfectly independent, though they are produced by the same cause. The advice, therefore, of Quesnay, and other surgeons, of trephining in all cases of fractures, even when they are of the most simple kind, is perfectly inadmissible,

and should be rejected by every enlightened member of the profession.

If there be any symptoms of injury of the brain, at the same time that there is a fracture of the cranium, we should endeavour by all means to ascertain whether they are owing to the pressure of the osseous fragments upon the encephalon. If the external wound be large, and the bone splintered, a simple examination will generally be sufficient to enable us to ascertain the nature of the injury: in cases of an opposite character, however, this is by no means the case; and it then becomes absolutely necessary to make a slight incision into the scalp, in order to expose the injured part of the cranium. If any of the splinters are depressed, such of them as are completely detached should be removed, while those which still adhere at one of their extremities, and produce a compression of the brain at the other, should be elevated, in preference to removing them, which does not appear to afford any particular advantage. The manner of fulfilling these different indications will be more fully discussed in speaking of the application of the trephine.

If, however, there is no solution of continuity of the cranium, and there are symptoms of injury of the brain, or if, in case of fracture, these symptoms still continue, even after the depressed fragments of bone have been removed, what then, it may be asked, is necessary to be done? Supposing that there is an effusion of blood, would it be proper to apply the trephine at the place where the blow was inflicted, in order to discharge the fluid? unquestionably not: for it is impossible, in the present state of our knowledge, to know precisely the seat of the effusion, or, in fact, whether there is any effusion at all; for the symptoms which are observed may be owing to a congestion or to an engorgement of the substance of the brain.

As the success of the operation of trephining depends entirely upon a careful diagnosis, and as this diagnosis is extremely obscure, it is generally imprudent or at all events useless to have recourse to this operation in wounds of the head complicated with cerebral symptoms. Under these circumstances, therefore, the surgeon should confine himself to a general mode of treatment, and should proceed upon rational and philosophical principles.

The cases in which the operation of trephining may be regarded as really useful, are those where the cranium is fractured and the fragments are depressed: but even in these cases, according to some, the severe symptoms of the injury of the brain or of its envelopes may be entirely disregarded, since there are numerous examples where such wounds have been perfectly cured under the influence of internal remedies, without leaving any unpleasant cerebral symptoms, although no attention was paid to the depressed portions of bone. Notwithstanding this, the operation of trephining should never be neglected in cases where the aperture resulting from the fracture

is too small to admit of the free discharge of the fluids which are extravasated in the interior parts of the brain.

OPERATION OF TREPHINING.

Apparatus.—The instruments which may be required for an operation on the skull, are two or three trephines of different diameters, a large scalpel, a lenticular knife, several small semi-circular saws, a simple elevator and the elevator invented by J. L. Petit, and afterwards improved by M. Louis, a raspatory, trepan forceps, a steel-screw, a brush for cleaning the saw, a tooth-pick, tenacula, sponges and warm water, needles and ligatures, a ball of linen with a thread attached to its middle, dry lint, a few compresses, and a bandage.

Operation.—Before commencing the operation it is necessary to bear in mind that the trephine should never be applied along the course of the sutures, especially along those which correspond to the sinuses of the dura mater, or below the middle portion of the occipital bone, at the inferior angle of the parietal, or upon the frontal sinuses.—The patient is to be placed upon the side opposite to that on which the operation is to be performed, or if the trephine is to be applied to the vertex of the head, he may sit in an easy chair. In the first case, the head of the patient is to be held by proper assistants, and is to be supported upon a pillow which should be rendered firm by a board.

Having shaved the scalp to a sufficient extent, the bone must next be exposed, either by enlarging the wound, or, if the integuments are not divided, by making a crucial incision, or one in the form of the letter T or V, according to the circumstances of the case. The scalpel should be carried as far as the surface of the bone, taking care not to introduce its point through the fracture. As soon as the incision is made, the flaps are to be turned back, and if there be any hemorrhage, it is to be checked by making pressure on the mouths of the divided arteries, or by the application of the ligature. The pericranium is then to be divided at the base of the flaps and removed with the scalpel.

Having determined upon the place where the crown of the trephine may be most advantageously applied, the flaps of the incision are to be covered with a piece of cloth, so as to keep them in their proper place, and protect them from the action of the instruments. The surgeon then places the trephine, armed with its centre-pin, upon the portion of bone intended to be perforated, holds it nearly in a perpendicular direction, and turns it several times upon its axis, so as to mark the place where the perforator is to be introduced. This instrument is then to be secured to the trephine, and placed in the hole made by the centre-pin. The forehead is then to be placed upon the head of the trephine, the beam of which is to be held with the right hand, and turned from right to left until the hole

formed by the perforator is large enough to admit the centre-pin.* The trephine is then to be held like a writing pen, and removed from the cranium, in order to substitute the crown of the instrument for the perforator. Taking the instrument in the same manner as when first applied, the operator introduces the centre-pin which surmounts the crown, into the hole made by the perforator, and turns the beam of the trephine from right to left. The first turns should be made slowly and with great precaution; but, in proportion as the circular groove or gutter increases, the instrument may be turned with more rapidity, taking care always to hold it in a direction perpendicular to the surface of the bone. As soon as the groove is sufficiently deep to enable the crown to keep its place, the instrument is to be withdrawn, in order to remove the centre-pin. If it be intended to use the steel-screw for the purpose of elevating the circumscribed piece of bone, its point should now be introduced into the hole of the centre-pin, and turned until it is firmly fixed. The trephine is then to be re-applied, and turned in the manner we have just stated, care being taken that it be frequently removed, in order to brush away the sawings and ascertain the depth and evenness of the groove. When the bone begins to move, and the resistance of the instrument diminishes, the trephine should be moved with more precaution, and as soon as the bone appears to give way, it should be extracted with the simple elevator, which is to be used as a lever of the first kind. After the bone has been removed, the opening should be carefully examined, and if there be any irregularity or projecting edge of bone, it should be gently smoothed off with the lenticular, the probe-pointed extremity of which is to be applied against the internal surface of the cranium, in order to prevent the instrument from compressing the brain. The rest of the operation is to be conducted according to the circumstances of the case.

If there be any extravasation of blood or other matter, and a single aperture is not sufficient to enable the fluid to escape, it will be necessary to make one or two more openings, though a simple counter-opening, if practicable, will always be preferable. If there be no extravasation between the bones and the dura mater, and this membrane is tense and discoloured, and forms a fluctuating tumour, it may be readily opened by a perpendicular incision with a common sharp-pointed bistoury.

When the fragments are depressed, and can not be removed by a simple application of the trephine, they should be restored to their natural level by means of an elevator, and then cut away with the crown of the trephine, or a small circular saw. The moveable spiculæ should be carefully removed with a proper

* The instrument which is here alluded to by the author, is usually called a *trepan*, and is somewhat similar to a joiner's wimble: it is, I believe, never used in this country.—S. D. G.

instrument, and if any have penetrated the dura mater and brain, they should always, if possible, be extracted with the forceps. In some instances their removal may be greatly facilitated by enlarging the openings in the dura mater, especially if they be very narrow, and the fragments have penetrated to some depth.

Treatment after the operation.—When the operation is completed, all that will be necessary, especially if the surgeon has made but a single aperture through the cranium, and the state of the soft parts will admit of it, is to approximate the edges of the wound, and cover them with dry lint and a light compress. Some surgeons, however, are in the habit of closing the opening in the cranium with a linen ball, spread with simple cerate, and of applying dry lint and one or two compresses, and supporting the whole apparatus with a handkerchief or roller, carried several times round the head, and pinned to the patient's night-cap.

As soon as the wound is dressed, the patient should be placed in a convenient posture, and recourse should be had to such measures as will be best calculated to prevent the inflammation of the brain and its envelopes, as well as the erysipelatous inflammation of the scalp, which constitutes not only a severe and dangerous affection, but one of the most common complications of wounds of the head. If the wound suppurate, the dressings should be removed once about every other day, until the cicatrization is completed; and as soon as it has perfectly healed, the parts should be protected with a piece of paste-board or leather.

PHLEGMONOUS ERYSIPELAS OF THE SCALP.

Phlegmonous erysipelas, which constitutes one of the most dangerous consequences of wounds of the head, may sometimes be prevented by the use of blood-letting, and the other antiphlogistic means which are indicated in injuries of the scalp, as well as by the precautions that should be observed in the treatment of wounds of other regions. As soon, however, as the erysipelatous swelling is developed, these general remedies will be perfectly inefficient, and the progress of the complaint can only be arrested by making large and deep incisions into the soft and inflamed parts, the strangulation of which is the principal cause of the severe symptoms of the disease. In these cases, the incision should merely extend through the integuments; but if it be necessary, at the same time, to give vent to collections of matter, it should extend as far as the pericranium, and be of a crucial form. The lips of the wound must be kept apart by means of lint, and be covered with soft emollient poultices, until all the inflammatory symptoms have completely subsided.

General and local bleedings, the use of tartarized antimony, unless there be some concomitant gastro-intestinal irritation,

and the different means which constitute the treatment of erysipelas, should be strictly employed. By these means we can alone hope to put an obstacle to the transmission of the inflammation, not only to every part of the head and face, but also, as too frequently happens, to the brain and its investments.

ENCYSTED TUMOURS.

When these tumours are of a small size, and especially when they consist in the form of a bag filled with fluid, they may be cured by burning them with the caustic potash, according to the method pointed out at page 51, or with some liquid caustic, such, for instance, as the nitric acid, which may be applied upon the tumour by means of a quill. As soon as the cyst is opened, and completely emptied of its contents, it is important that the caustic should be applied to its base in order to excite inflammation.

When these tumours, however, are of a large size, the caustic will have but little effect, and it will then become necessary to extirpate them with the knife. To effect this, the operator should make a crucial incision through the integuments, taking care not to interfere with the tumour, which is to be raised with the fingers or hook, and dissected from the surrounding parts. As soon as it is removed, the flaps should be approximated, and united by union of the first intention. Sir Astley Cooper is of opinion, that the best and most expeditious method of extirpating these tumours, consists in emptying the sac by making an incision in its centre, and then detaching it from the adjacent parts by means of the knife.

When these tumours are extremely large, it is evident that the operation which we have just recommended, will give rise to a very large wound, and to a copious and protracted suppuration. In these cases, therefore, especially as the skin which envelopes the tumour is altered and attenuated, it will be better to make two semi-elliptical incisions, so as to comprehend every part of the diseased integuments, or such parts as are not necessary for covering the wound: the rest of the operation is to be conducted as under ordinary circumstances. In some instances, however, it will be altogether imprudent to remove these tumours in the manner we have just pointed out; and then the ligature can alone be resorted to without endangering the life of the patient. We shall describe this operation when speaking of goitre.

FUNGIOUS TUMOURS OF THE DURA MATER.

The treatment of fungous tumours of the dura mater, is at present altogether unsatisfactory; and the application of caustics, incisions, and partial extirpations, have all been recommended and employed, but with little success. The total extirpation of the tumour has also been tried, after the passage

in the cranium was enlarged by means of the trephine; and in fact, this appears to present the only chance of success. This method, therefore, should by all means be adopted; and when the tumour is too large to admit of being excised, we should at least endeavour to palliate the severe symptoms which it occasions, by enlarging the bony orifice which covers and compresses its base, by the method to which we have just alluded.

*b.—Injuries of the Ear.**

WOUNDS OF THE EXTERNAL EAR.

A wound of the external ear, whatever may be its size or shape, is to be treated upon the same principles as a wound in any other part of the body. When the parts are properly cleaned, the edges of the division should be carefully approximated, and kept in this position by means of narrow strips of adhesive plaster, simple dressings, and a bandage. The bandage should always be applied with moderate firmness, and the space behind the ear should be carefully filled with soft cotton or wool, in order that the part may be compressed without risk of producing pain, or sloughing. When these means, however, are insufficient for keeping the edges of the wound in apposition, it will be necessary to apply a few sutures, which should always be made with a fine sewing needle, and a very thin silk ligature.

IMPERFORATION OF THE MEATUS AUDITORIUS EXTERNUS.

When the meatus is merely closed by an external membrane, the surgeon is to make a crucial incision by means of a bistoury, cut away the small flaps, and keep open the orifice with a suitable tent, until the cicatrization is completed. When the membrane, however, is more deeply seated, the operation will be more difficult of execution, and the result more doubtful. In this case, the incision should be made by directing the point of the bistoury successively from one side of the membrane to the other, and, as the flaps can not be removed, they are to be kept separated by means of a blunt tent, until the wound has healed.

FOREIGN BODIES IN THE MEATUS AUDITORIUS EXTERNUS.

Extraneous substances in the meatus auditorius, such as peas, beads, cherry-stones, &c. may generally be removed with a pair of small forceps, a bent probe, or a curette. If the attempt, however, should fail, and the foreign body offer much resistance, it will be necessary to break it with the blades of

* As the author has taken no notice of the diseases of the ear, it was thought that a short account of them, inserted in this place, would not prove altogether unacceptable to the American practitioner.—S. D. G.

a pair of strong forceps, and then remove the fragments by throwing in a stream of water from a syringe, as recommended by Dr. Gibson.—When insects find their way into the ear, or are generated in the meatus, they may be easily removed by the introduction of a few drops of olive oil, or of an infusion of tobacco in oil of almonds.—When the meatus is obstructed with inspissated cerumen or wax, the best and most effectual means of removing it, is the repeated injection of warm water and soap. In performing this operation, the surgeon should use a pretty large syringe, and inject the fluid with considerable force, care being taken not to pass the pipe too deeply into the ear, so as to injure the membrana tympani.

POLYPI IN THE MEATUS AUDITORIUS EXTERNUS.

When these tumours are situated so near the external orifice as to admit of being taken hold of with a hook or a pair of small forceps, they may, in general, be easily cut away. They may also sometimes be extracted with a pair of slender forceps; but this operation requires considerable skill, and cannot always be easily executed. When the tumours are more deeply situated, it has been recommended to remove them with the ligature, or the application of escharotics; but these means appear to be either insufficient or dangerous.

PERFORATION OF THE MEMBRANA TYMPANI.

This operation, which is sometimes rendered necessary in cases of deafness arising from permanent obstruction of the Eustachian tube, was first suggested by the celebrated Mr. Cheselden, and afterwards practised by Sir Astley Cooper. The operation has since been performed with various degrees of success, both in this country and in different parts of Europe.

Method of Mr. Buchanan.—"In performing this operation," says Mr. Buchanan, "a room with a window fronting the south should be chosen, and the patient should be placed on a low seat, so that the rays of the sun may fall into the meatus. The manubrium, or handle of the malleus will then be distinctly seen, pointing downwards and inwards; occupying the superior half of the membrana tympani. The surgeon being seated on a high chair, should lay his left hand on the head of the patient, and, with the right, take hold of the perforator in the same manner as he would a pen when writing: he should then cautiously and steadily enter the point of the instrument into the membrana tympani, about half way between the centre and its lower edge, and with the thumb and index-finger give the perforator half a turn one way, and then half a turn the other, and in this manner gently push the point about a line through the membrane."

c.—Injuries of the Face.

WOUNDS OF THE EYE-BROWS.

Wounds of the eye-brows should be carefully united, and their edges maintained in apposition by means of strips of adhesive plaster. The inflammatory symptoms of the brain which often accompany them, and which are rather to be attributed to the injury of that organ, than to the frontal nerve, require the same treatment as those which arise in consequence of wounds of the scalp.

WOUNDS OF THE EYE-LIDS.

The preceding observations may with equal propriety be applied to wounds of the eye-lids, especially when they are produced by a sharp-pointed instrument, so as to injure the vault of the orbit. When the tarsal cartilages are completely divided, and it is impracticable to maintain the lips of the wound in contact by strips of adhesive plaster, it will be necessary to apply one or more sutures, according to the circumstances of the case.

ENCYSTED TUMOURS OF THE EYE-LIDS.

When these tumours are of a small size, they frequently disappear spontaneously, or by the application of the diachylon or soap-plaster. We have seen instances in which they have disappeared in a very short time by the use of Vigo's plaster. When these tumours, however, are large, and resist these topical applications, it will be necessary to extirpate them by means of the knife. The operation is performed by making a transverse incision into the eye-lid, taking hold of the tumour with a hook, and separating it from the surrounding parts, either with the point of the bistoury or a pair of scissors. In making the external incision, it will be necessary to interfere with the skin of the eye-lid or the conjunctiva, according as the tumour is situated in front or behind the tarsal cartilage. If the tumour be situated behind the tarsal cartilage, and on the superior eyelid, the patient should be seated upon a chair, and have his head supported by an assistant, who should place the extremity of one of his fore-fingers upon the tumour, and the other upon the free margin of the eye-lid, and turn it out, so as to expose the parts fairly to the operator.

When the tumour is situated upon the inferior eyelid, the operation is to be conducted in the same manner as in the preceding case, with the exception that the assistant should be in front, and the operator behind the patient.

When it is necessary to cut through the skin of the eye-lid, the assistant should support the forehead of the patient with

one hand, and draw out the eye-lid with the other. The rest of the operation is to be conducted in the manner already pointed out; and as soon as it is completed, the lips of the wound are to be brought into contact, and maintained in this position by strips of adhesive plaster: the eye should be covered with soft lint, a light compress and bandage.

ECTROPEON.

If the eversion of the eye-lid be owing to a swelling of the palpebral conjunctiva, and the skin of the lid is perfectly sound, and sufficient to cover the whole ball of the eye, which may be easily ascertained by pressing upon it with the end of the finger, all that will be necessary is the removal of the superfluous portion of the conjunctiva.

If the affection be recent, and the eversion of the eye-lid slight, the best means that can be employed is to touch the fungous excrescence of the conjunctiva with a solution of the nitrate of silver. For this purpose the eye-lid is to be everted with the fingers of the left hand, in order to apply the caustic, which is to be kept on until it has produced an eschar, when, without letting go the lid, the cauterized part is to be smeared over, by means of a pencil or a feather, with a little oil, to prevent the caustic from acting upon the ball of the eye. This operation should be repeated until the fungous excrescence is completely destroyed, especially when it is near the tarsal cartilage. As soon as the wound begins to heal, the cicatrization should be promoted by applying proper washes to the ball of the eye, such, for instance, as a decoction of barley water sweetened with honey.

If the tumour be large and of long standing, it may be proper to try the means that have just been pointed out; though it will generally be better to shave it from the palpebral muscle. The patient being seated upon a chair, with his head slightly turned backwards, the surgeon holds the everted eye-lid with the index and middle fingers of the left hand, and with a pair of small curved scissors removes the tumour as near as possible to its base: and if both eye-lids be affected, he performs the same operation upon the other, taking care always to commence with the inferior lid. If the tumour be so large that it can not be included between the blades of the scissors, the operator should take hold of it with the hook or a pair of forceps, and detach it from its base with a sharp convex bistoury. The hemorrhage is generally profuse, but it soon stops of itself. When the operation is completed, two compresses should be applied, the one upon the superior, and the other upon the inferior margin of the orbit, and covered with a uniting bandage called the monocolus,* which is to be arranged so as to keep the eye-lids in their proper situation.

* From *monos*, single, and *oculus*, the eye.—S. D. G.

MONOCULUS.

This bandage consists of a single-headed roller, about five yards in length, and two inches and a half in width.—*Application.*—The end of the roller is to be applied to the back of the neck, and one turn is to be made over the forehead, so as to meet the extremity of the bandage. The roller is then to be carried under the ear of the side affected, obliquely over the cheek underneath the eye, and regularly over the root of the nose, and the parietal bone, to the nape of the neck. After having thus repeatedly passed the roller from behind forwards, with the precaution that the third turn shall slightly overlap the second, and the fourth the third, the application of the bandage is completed by carrying it round the head and lower jaw, and fixing it to the patient's night-cap.

The dressings are to be removed in about twenty-four hours, when the eye-lid will be found to have almost entirely recovered its natural situation. During the following days it will be sufficient to bathe the wound with simple water, or with a mixture of barley water and mel rosæ; and if there be a reproduction of the fungous excrescences, they should be removed with the nitrate of silver.

If the ectropeon result from the puckering of the skin of the eye-lids or of the surrounding parts in consequence of a vitiated cicatrix, it will likewise be necessary to excise a portion of the tumefied conjunctiva, in order that the formation of the new cicatrix may draw the eye-lid inwards and have a tendency to restore it to its natural situation. This operation, however, is seldom sufficient, and the eye-lid, though restored to its proper situation, remains shorter and less moveable than it is in its healthy state, especially when the eversion amounts to a considerable extent. In these cases we are authorized to perform the operation only when the eye-lid is long enough to cover the ball of the eye.

The operation consists in making an incision through the conjunctiva along the tarsal cartilage, taking care not to interfere with the puncta lacrymalia; in raising the flaps with a pair of forceps; in separating them from the subjacent parts by a careful dissection, as far as the point where the conjunctiva is reflected over the ball of the eye; and in snapping them off with a cut or two of the scissors. Before the operation is commenced, we should always endeavour to stretch the shortened eye-lid; but as this object can never be completely effected by the simple section of the cutaneous bands, which give rise to the eversion, Scarpa recommends the use of soft bread and milk poultices, oleaginous embrocations, and the monocular bandage, which should be arranged so as to keep the eye-lid in its natural situation. These applications, it must be understood, should be employed a few days previously to the operation.

In old people, in whom the eversion of the eye-lid often depends upon an extreme relaxation of the conjunctiva, and in those in whom the eye-lid can not be elongated, no benefit can be afforded by a surgical operation.

Where the disease, however, depends upon a relaxation of the conjunctiva, and the eye-lid has acquired a great degree of laxity, and such dimensions that a simple incision will not be sufficient to remedy the deformity, it may be treated according to the method of Sir William Adams, which consists in cutting out a piece of the lid, with a pair of scissors, in the form of the letter V, extending through its whole thickness, and in uniting the lips of the incision by means of the suture.

TRICHIASIS.

If the tarsus and the cilia are turned towards the ball of the eye, as is most frequently the case, the deformity may be remedied by producing an artificial eversion of the eye-lid, and by thus fixing it in its natural position, so as to keep the cilia removed from the surface of the ball. The method of Scarpa, which was formerly adopted by Janin, will perfectly answer this indication, provided it is performed with care and skill. The patient is seated upon a chair, if an adult, or placed upon a table, if an infant, and turned obliquely towards the light: his head is supported by an assistant. The operator standing in front of the patient, and drawing away the hair of the lid with the extremity of a probe, takes hold of the skin of the eye-lid with a pair of dissecting forceps, or the point of the index-finger and thumb of the left hand, and makes a fold, the centre of which must exactly correspond to the centre of the trichiasis, whether it occupy the whole, the half, or one third of the margin of the lid. The fold is then to be raised according to the extent of the inversion of the tarsus or the laxity of the skin, and the patient is to be requested to separate his eye-lids. If the tarsus and the cilia now resume their natural direction, he may be certain that the portion of skin which he has pinched up will be sufficient to answer his purpose. Having observed these important precautions, the surgeon removes the fold of skin with a pair of forceps; in doing which, he should be extremely careful to make his incision near the inverted tarsus, for, without this precaution, the disease will return after the healing of the wound, in consequence of the extension of the skin between the margin of the eye-lid and the cicatrix. Before he begins the operation, therefore, he should be convinced that one of the blades of the scissors rests upon the external margin of the tarsus.

If the trichiasis be double, the surgeon should operate upon both lids at the same time, taking care to commence at the inferior, in order to prevent the hemorrhage from interfering with the operation.

When the operation is completed, the lips of the wound should be brought into contact either by depressing the eye-brow, if it be the superior lid that has been operated upon, or if it be the inferior, by pushing the skin from below upwards, and confining it against the margin of the orbit. This position should be favoured by placing a compress upon the eye-brow, and another upon the upper part of the face, and confining them with the monocolous bandage.

The dressings should not be removed until three or four days after the operation, when the parts will generally be found united and in their natural position and direction. The subsequent treatment should be the same as in all cases of simple wounds.

If there be an unnatural direction of the cilia, unattended with displacement, they should be carefully pulled out; but if this be insufficient, as is generally the case, they should either be removed entirely, or at all events kept from the eye by everting the tarsus by the operation which we have just described.

LACRYMAL TUMOURS AND FISTULA LACRYMALIS.

Every mechanical obstruction to the course of the tears in the ductus ad nasum, must necessarily produce, if it continue for a considerable time, an accumulation of tears and of mucus in the lacrymal sac, and consequently also a distention and attenuation of its parietes, attended with ulceration, and finally with a rupture and continual effusion of the tears through the accidental opening. This obstacle may be produced either by the viscid nature of the secretions on the surface of the eye, and in the lacrymal passages, by the engorgement and thickening of the mucous membrane of the ductus ad nasum, by the adhesion of its parietes, by the pressure of a neighbouring tumour, or by the presence of a foreign body in the duct itself.

Whatever may be the cause, however, the principal indication is always the same, and consists in favouring the course of the lacrymal fluids by the re-establishment of the natural passages, or in the performance of an operation for the purpose of establishing an artificial route. The means which have been proposed for the fulfilment of these indications are extremely numerous; but on the present occasion we shall only give an account of those which are generally employed at the present day, and point out the cases to which each of them is more especially applicable.

§ I. If there be merely a small recent lacrymal tumour, which is indolent, and presses upon the parts so as to produce an effusion of a portion of the fluid which distends the ductus ad nasum, the surgeon may entertain the strongest hope that it will disappear under the influence of emollient or aromatic fumigations, applied to the nose, aided, if they should be insufficient,

by rubbing upon the tumour a mixture composed of four parts of cerate, and one of calomel (*Marjolin*), care being taken to empty the parts frequently by pressure.

If there are local inflammatory symptoms, however, it will be necessary, in order to avoid the inflammation and ulceration of the lacrymal sac, to resort to the antiphlogistic method of treatment, especially to blood-letting, leeches, and cooling applications. "It is only by combating the inflammation," observes Mr. M'Kenzie, "that we can expect to cure this disease, and not by attacking merely one, or even several of the symptoms. Dilatation, for instance, by the introduction of probes through the canals into the lacrymal sac, and even into the nose, would only be subjecting the inflamed parts to a new cause of irritation, and might thus produce effects which would render a complete cure difficult, if not impossible." M. Lisfranc, of Paris, entertains similar ideas, and recommends the application of leeches in every stage of the disease. We can readily conceive the utility of this method of treatment; and its success is so much the more valuable, since the different operations that have been proposed for the cure of this disease, are frequently useless, with the exception of that which has so long been successfully performed by Professor Dupuytren.

M. Lisfranc, who, like many other surgeons, conceives that fistula lacrymalis is generally owing, especially at its commencement, to an acute or chronic inflammation of the mucous membrane of the ductus ad nasum, is of opinion that, since ophthalmia can be cured by an antiphlogistic method of treatment, if it be acute, or by discutient and revulsive means when it is chronic, in combination with an appropriate regimen and such medicines as the state of the patient may require, we may always have the strongest reason to suppose that the inflammation of the mucous membrane of the ductus ad nasum, will yield to the same means, especially as it communicates with the conjunctiva. In consequence of this opinion, M. Lisfranc makes use of the following method of treatment. In case the disease is attended with acute inflammation, he draws blood from the arm in the morning; at night, he orders the application of twenty-eight or thirty leeches to the temple or the mastoid process of the affected side; and this local evacuation is repeated every twenty-four hours during the existence of the acute inflammatory symptoms, and afterwards every second or third day, according to the circumstances of the case. At the same time that these means are employed, he applies emollient fumigations three times a day to the nostril of the affected side, and emollient poultices enclosed between two pieces of linen, to the parts.—The regimen is more or less antiphlogistic, according to the symptoms of the case.

When the inflammation is chronic, the fumigations should be made with infusions of the *sanibucus nigra*, the *thymus vulgaris*, or of any other aromatic plant, either alone, or in com-

bination with alcohol, according to the degree of excitement they are intended to produce. From three to eight leeches should likewise be applied to the temple or near the outer angle of the eye;* and these small local bleedings should be repeated every second or third day; but if the inflammation assumes the acute character, the antiphlogistic method of treatment must be employed in its full extent, and as soon as it has abated, we may again resort to stimulants. In some instances, four or five leeches will cause considerable irritation, and it will then become necessary to apply eight or nine; if, on the contrary, the irritation which they produce is slight, we may prescribe two or three; and in order to avoid deformity, they should be small.

Besides these means, recourse should be had to astringent collyria, and a constant suppuration should be kept up on the back of the neck by the application of blisters, or the introduction of a seton, provided the nature of the case is such as to demand it.

In obstinate cases, this mode of treatment should be employed in its full extent; but when it acts slowly, it will often be useless, nor will it be capable of effecting a cure when there is a caries of the os unguis, and a contraction or complete obliteration of the duct. In recent and simple cases of lacrymal tumours and fistula lacrymalis, however, the surgeon should always give it a fair trial.

If we are unable, by any of the methods which we have just pointed out, to produce a resolution of the tumour, and if every thing has the appearance that the collection of matter is about to make an opening through the skin, we should immediately open the sac by a large incision, in order to discharge the purulent matter which it contains, and to prevent, if possible, the formation of a fistula. After the rest of the inflammation has subsided, the lacrymal passage should be immediately re-established, according to the methods that will be presently pointed out. At the same time that we employ these means, particular attention should be paid to the state of the patient, and such remedies should be prescribed as will have a tendency to re-establish his health. In scrofulous persons, who are particularly subject to affections of the lacrymal apparatus, the local means should be aided by a proper constitutional treatment, especially if there be a profuse chronic effusion of tears, and of the other fluids which pass through the lacrymal passages.

§ II. When there is a fistula lacrymalis, or an opening in a lacrymal tumour, it will be extremely important, before the treatment is commenced, to ascertain the real state of the ductus ad nasum, of the conduits and puncta lacrymalia. In most cases, however, it will be proper to commence the treatment

* M. Lisfranc is of opinion that the application of a few leeches is far preferable for the purpose of producing resolution than a larger number.

by employing those means which were pointed out in speaking of lacrymal tumours, because, if the swelling of the lacrymal sac, and the obliteration of the ductus ad nasum, are owing to a thickening of the mucous membrane, or to a viscid and inspissated state of the fluids which they contain, it will be reasonable to suppose that the affection may be cured without being obliged to resort to an operation.

For this purpose, therefore, it will be necessary to resort to the use of internal remedies, to the application of leeches, and the means that have been already enumerated; and if the effusion of the lacrymal fluids be profuse and of long standing, recourse should be had to warm lotions, containing a small proportion of alcohol, and to Janin's ointment, which should be weakened with lard, and a portion, equal to the size of a barley-corn, should be applied between the lids every morning and evening. Or, adopting the method of M^r Kenzie, we should, if possible, empty the lacrymal sac by pressure, and after the patient is put to bed, pour into the inner canthus of the eye a weak solution of corrosive sublimate.

℞. Aq. Ros.	ʒij.
Hydrargy. Oxymuriatis,	gr.ss.
Mucil.	ʒss.
Vin. Opii,	ʒss. M.

When this mixture has remained in the eye for about half an hour, and after the lids have been carefully dried, a small quantity of Janin's ointment should be applied to the caruncula lacrymalis and edges of the eye-lids, by means of a very soft camel-hair pencil.—This treatment should be repeated three times a day.

If there are old ulcers on the margin of the eye-lids, which have resisted the use of Janin's ointment, they should be touched with the nitrate of silver; and if the vessels of the conjunctiva are in a varicose state, it will be proper to pour a few drops of the tincture of opium upon the ball of the eye.

If, notwithstanding the employment of these different means, the disease still continues, all our efforts must be directed to the removal of the obstruction of the nasal duct. But before any thing is done, we should ascertain whether the lacrymal passages are obliterated; for if they are, every operation, except that of making an artificial opening through the os unguis, will be perfectly useless. If the puncta lacrymalia are open, which should generally lead us to infer that the ducts are unobstructed, we should introduce a probe, and, if necessary, remove the obstruction according to Anel's method.

OPERATION FOR THE REMOVAL OF OBSTRUCTIONS OF THE LACRYMAL PASSAGES, ACCORDING TO ANEL'S METHOD.

The method of Anel consists of two distinct operations—the introduction of a probe into one of the lacrymal ducts, and their injection.

Introduction of Anel's probe.—The lacrymal passages are probed by means of a very delicate stylet, which is terminated by a small probe-pointed extremity. The operation is performed by taking the stylet in the right hand, if the surgeon wishes to operate upon the left eye, and vice versâ: in operating on the right eye, however, the surgeon may likewise use the right hand, provided he stands behind the patient. The patient being seated upon a chair, with his head turned backwards, the operator gently elevates the superior eye-lid, introduces the stylet from below upwards into the superior punctum lacrymale, and then directs it from without inwards, and slightly from above downwards, according to the direction of the duct. As soon as the stylet has arrived in the lacrymal sac, the tension of the eyelid should be removed, and the instrument gently pushed from above downwards, by moving it between the fingers, as far as it will pass without effort. If the ductus ad nasum is unobstructed, or only partly so, the stylet will readily pass as far as its inferior orifice.

In injecting the lacrymal passages, the fluid should be introduced through the inferior punctum lacrymale, on account of its shortness and lesser curvature. The instruments which are required for the operation, are one of Anel's syringes, and several syphons made of gold or platina, of different sizes, and perfectly adapted to the syringe. The surgeon takes the syringe, previously filled with the injecting fluid, between the index and middle fingers of the right hand, and places the thumb below the ring of the piston; he then depresses the inferior eye-lid with the index finger of the left hand, introduces the extremity of the syphon almost perpendicularly from above downwards into the punctum lacrymale, carries the syringe a little obliquely from without inwards, and from above downwards, and pushes the piston in a slow and gradual manner. If the surgeon wishes to operate with the right hand on both eyes, he should, as in the introduction of the probe, place himself behind the patient, when he injects the punctum lacrymale of the right side.

When these injections are intended to form the principal means of the treatment of fistula lacrymalis, they should be repeated twice or three times a day, and should always be used before we resort to the probe. In the most simple forms of the disease, these injections will sometimes be attended with the most important results, by removing the obstruction of the lacrymal sac or of the ductus ad nasum; but in most cases, they are insufficient, and we are therefore almost always constrained to resort to some of the other means that have been proposed for the cure of this disease.

If we are convinced by an examination with the probe, or with injections through the puncta lacrymalia, or through the fistulous opening itself, that the ductus ad nasum is really obstructed, we should by all means introduce the probe, and as-

certain whether there be merely an obstruction, or a contraction of the passage. This examination may be effected in two different ways, one of which bears the name of Laforest, and consists in introducing a probe through the inferior opening of the duct; the other, that of Petit, and is performed by passing a probe through the superior orifice, and requires that the sac should be previously opened. This method, though not so easy of execution as the former, is decidedly the most preferable.

CATHETERISM OF THE DUCTUS AD NASUM, THROUGH THE SUPERIOR ORIFICE.

An incision is made into the lacrymal sac, in the following manner: the patient being seated upon a chair, with his head resting on the breast of an assistant, the surgeon carries the index finger of the left hand towards the external angle of the eye, and extends the integuments so as to render the tendon of the orbicularis muscle perfectly prominent. The extremity of the index finger of the right hand is then to be carried from without inwards, upon the inferior margin of the orbit, until it is arrested by the prominence of the superior maxilla, near the internal angle of the eye, where, according to M. Lisfranc, will be found the superior extremity of the ductus ad nasum. Continuing to stretch the integuments with the left hand, the operator takes a bistoury, and holding it like a writing pen, with its back turned towards the side of the nose, introduces its point into the parts from before backwards. As soon as the bistoury has arrived in the sac, which may be known by the want of resistance, the handle should be brought towards the internal extremity of the eyebrow; and in this position the point of the instrument should be pushed into the ductus ad nasum. The back of the blade should then be inclined a little outwards, in order to facilitate the introduction of the probe.

This incision, as may be supposed, is perfectly useless when there is already a fistula, and the opening is of such a nature as to permit the introduction of the probe. When the probe, however, can not be carried along the bistoury, it should be introduced according to the method of M^r Kenzie, which consists in passing it in a horizontal direction until it comes into contact with the nasal side of the sac, when it must be brought to a vertical position, by directing its point downwards and backwards; and then turning it upon its axis, it will enter the duct, if unobstructed, with the greatest facility.

If the probe meet with any obstacle, it should be pushed downwards, without violence, by turning it round between the fingers, and giving it various directions.

Numerous operations have been devised for the removal of the obliteration of the ductus ad nasum, and for the purpose

of preserving its proper diameter; but, on the present occasion, we shall only give an account of those which are in most common use, and which have received the approbation of skilful practitioners.

OPERATION FOR FISTULA LACRYMALIS.

a.—According to the method of Professor Beer.

After having made a passage through the ductus ad nasum, by means of the catheterism which we have just described, the surgeon is to take a piece of cat-gut, of such a size as to pass with some degree of difficulty, and introduce it into the duct. Before the operation is commenced, however, one of its ends should be softened between the teeth, straightened, and dipped in a little sweet oil. When this has been done, it should be introduced to the extent of at least six inches, in such a manner that its lower end may be easily drawn through the nose. The upper portion of the cat-gut must be coiled up, and kept within a linen compress on the patient's forehead. As soon as the operation is completed, a small piece of lint should be introduced into the opening of the sac, and maintained there by means of a strip of adhesive plaster. In a few hours after the operation, the patient should endeavour to bring the lower end of the string through the nose, by closing his mouth and the opposite nostril, and making severe efforts to blow his nose. When the extremity is disengaged, it should be drawn over the side of the nose, and kept there by a small strip of adhesive plaster.

The next morning, the plaster which closes the opening of the sac, and the piece of lint, should be removed with warm water, and the duct syringed with the collyrium already specified in one of the preceding pages. As soon as the injection is completed, the upper end of the cord should be unrolled, and oiled, to the extent of about six inches; it should then be drawn gently through the sac and the ductus ad nasum, by pulling at the end which hangs out of the nostril; and when this is effected, the useless part should be removed with a pair of scissors. Whenever the injection is repeated, the mode of dressing should be conducted in the manner we have just described; and, in order to ascertain the degree of dilatation, it will be advisable, at each dressing, to pour a little water and laudanum into the sac, and observe the facility with which it runs into the nose. As soon as the first piece of cat-gut is consumed, a larger one should be introduced, and this operation, as well as the injections, should be repeated until the passage is large enough to enable the fluid to run freely out of the nostril.

In addition to this treatment, Professor Beer recommends the employment of certain topical applications, with a view of modifying the state of the mucous membrane of the lacry-

mal sac. Thus, when at the commencement of the disease, the probe can not be readily passed into the ductus ad nasum, which indicates a simple swelling of its parietes, it will be necessary, at each dressing, to soften the cord before it is drawn into the duct, with laudanum, and to inject a warm lotion, composed of the following ingredients: \mathcal{R} Sub-acetate of copper, nitrate of potash, and alum, each from three to five grains; distilled water, half an ounce; dissolve, and add wine of opium from one to two drachms, rose water, four ounces: mix.—The lint that is introduced into the sac, should likewise be dipped in the vinous tincture of opium; but if the probe experience much difficulty in passing through the duct, which may probably be owing to the presence of callous excrescences, the cat-gut should be smeared with the ointment of the nitrate of mercury, which is to be at first weakened, and afterwards gradually increased in strength. The wound is to be dressed with the same application, and the injection, to which we have so repeatedly referred, should be continued.

This treatment, according to Beer, should, like every other mechanical means that is employed for the same object, be perseveringly continued, until the disposition of the duct to contraction, is completely removed. If, during the employment of this method of treatment, the tears are observed to pass through the lacrymal ducts with difficulty, it will be necessary to resort to injections according to the method of Auel. In order to ascertain the existence of this disposition, Professor Beer has proposed to pour a few drops of some coloured fluid in the inner canthus of the eye, while the patient is lying on his back. If the ducts are unobstructed, the fluid will readily enter the lacrymal sac, whereas in cases of an opposite description, it will remain on the surface of the eye. Under these circumstances, the use of injections will be absolutely necessary.

The method of Professor Beer is applicable to a great number of cases of the disease, and answers the same purpose as the seton, according to the method of Petit, modified by Desault and Pamard; a method which is almost exclusively employed by some practitioners, and which consists chiefly in passing a roll of lint or cotton from below upwards into the ductus ad nasum, which is to be removed at each dressing and gradually increased in size.

b.—According to the method of M. Dupuytren.

This method, which is nothing but an imitation of that of Foubert, is preferable to most others, at least under particular circumstances, on account of its simplicity, the promptitude with which it is performed, and the trifling inconvenience with which it is generally attended.

The instruments which are required for the performance of the operation, are, 1st, a straight bistoury, with a firm narrow

blade, 2ndly, a canula of gold or silver, from eight to twelve lines in length, larger above than below, and presenting at its largest extremity a small button, slightly curved in the direction of its length, in order to adapt itself to the form of the ductus ad nasum, and cut slopingly at its other extremity; in such a manner that its opening shall look in the direction of the concavity of the curve; and 3rdly, a steel probe, made so as to slide easily in the canula, and having a flat handle at its upper extremity. This handle should be bent to a right angle, and adapted in such a manner, that by holding it between the fingers, and turning its point, as well as the canula which it supports, downwards, the concavity of the latter instrument shall be directed towards the operator.

The patient being seated upon a high chair before a window, with his head supported by an assistant who extends the eyelids, the operator opens the lacrymal sac by a single stroke of the bistoury, the point of which is carried behind the bony margin at the superior part of the ductus ad nasum.* As soon as the point of the instrument has entered the sac, the blade should be slightly drawn back, to enable the operator to introduce the point of the probe, furnished with its canula. The bistoury is then withdrawn, and the probe gently pushed into the ductus ad nasum, which should be entirely occupied by the canula, in such a manner, that the button of the instrument, being concealed in the lacrymal sac, may present no obstacle to the cicatrization of the external wound. As soon as the canula is properly introduced, the probe should be removed; and the patient desired to make a strong expiration, taking care to close his mouth and nose. If the air and the blood now pass through the wound, we may be certain that the canula is in its proper place, and that the communication between the lacrymal sac and the nasal fossæ is re-established. The wound should be covered with a piece of adhesive plaster to promote the union of its margins, which is frequently effected in about twenty-four hours.

If the canula create severe inflammation in the duct, it may be combated by the ordinary antiphlogistic means. It is scarcely ever necessary to withdraw the instrument; though sometimes we are obliged to do this, in order to allay the violent sufferings of the patient. To accomplish this, a small incision should be made upon the button of the canula, which should be removed with a pair of small forceps. As soon as the inflammatory symptoms have subsided, the canula may be again introduced in the manner we have already pointed out.

Another method, somewhat similar to that which is employed to destroy strictures of the urethra by cauterization, has lately been devised by Dr. Deslandes, of Paris. It consists in introducing a piece of caustic as far as the obstruction in the ductus ad nasum, by means of an instrument nearly similar to

* For the description of the manner of performing this opening, see page 179.

the one which we have just described, and which is likewise composed of a canula and a probe. The want of room does not enable us to describe it, but we shall refer the reader to the author's description in the Medical Review of Paris, for May 1825. This method may, with some modifications, be sometimes put in practice, especially in cases that are difficult to be understood, or where there are small bands or indurations in the ductus ad nasum, which obstruct the passage and can not be removed by a simple catheterism, or the introduction of the canula of Professor Dupuytren.

In those cases where there is an insurmountable obstruction in the ductus ad nasum, resulting, for example, from the presence of an exostosis, of a polypus, or from any other tumour in its neighbourhood, from a preternatural deviation of this duct, or from a complete obliteration, we should endeavour to remedy it by making an artificial passage through the os unguis. This operation, which has hitherto been generally reprobated and represented as unnecessary, is particularly recommended by Professor Scarpa, especially in those cases where there is a caries of the os unguis without a perforation of the mucous membrane. The operation of this eminent surgeon consists in opening the lacrymal sac, and in filling it with a piece of lint which should be left there for two days. At the expiration of this time, the plug is removed, and the surgeon introduces a conical canula, mounted upon a handle, into the opening, and applies it against the bone by carrying it a little obliquely from above downwards. This canula is intended to enable the surgeon to apply a small piece of caustic, which should be pressed with sufficient force to destroy the mucous membrane and the bone. If a single application of the caustic is not sufficient to answer the desired effect, it should be immediately repeated.

When the operation is completed, the sac should be filled with a plug of lint, spread with a little cerate. The patient should endeavour to draw up his nose several times a day a decoction of marsh-mallows; and the inflammation which arises should be combated by emollient applications. As soon as the eschars become detached, a tent or wax bougie should be introduced into the opening: this should be secured by means of a thread, and gradually increased in size. If there arise any fungous excrescences during the treatment of the disease, they must be destroyed with the nitrate of silver. At the end of about four or five months, the margins of the opening generally begin to cicatrize, and if the foreign body be now withdrawn, the external wound will speedily heal.

STAPHYLOMA OF THE CORNEA.

If the staphylomatous tumour be recent, and small, like that which sometimes occurs in children in consequence of the small-pox, it will be more prudent to leave the disease to the

operations of nature, than to employ any of the means that have been proposed for its cure. If, however, it be desirable to prevent its increase, we may have recourse to the method of treatment recommended by the celebrated Richter, which frequently proves successful, though it has always failed in the hands of Professor Scarpa. This treatment consists in producing an artificial ulceration by the repeated application of the nitrate of silver or of the chloride of antimony, until the tumour has undergone a sensible diminution: in applying this remedy, care should be taken to prevent the caustic from entering the eye. Richter asserts, that by this means, we may not only diminish the staphylomatous tumour, but restore the cornea to its natural transparency—a circumstance which is extremely desirable in the treatment of this disease, though it is of rare occurrence.

In severe cases of the disease where the tumour projects between the eye-lids, and is extremely painful, hard and varicose, at the same time that the sight is completely destroyed, the only means of arresting its progress and of diminishing the deformity, is to open the ball of the eye and to reduce it so as to enable the patient to wear an artificial one.

OPERATION FOR OPENING THE BALL OF THE EYE.

This operation consists in removing the cornea with a small portion of the sclerotica; and is executed with a large bistoury similar to a cataract knife, which must be plunged, according to Demours, into the sclerotica, at the distance of about one line from the external margin of the cornea. The edge of the instrument should be directed in such a manner as to leave a semi-circle of the sclerotica, of about one line in breadth, adhering to the inferior part of the cornea, which should be taken hold of with a pair of dissecting forceps, and removed with a curved scissors. A very small portion of the sclerotica should also be removed at the upper part of the eye.

When the operation is completed, the eye is to be covered with a piece of dry linen, and a light bandage. As soon as inflammation appears, we should resort to the application of emollient poultices; and if there arise any fungous granulations, they should be repressed with the nitrate of silver.

When the deformity of the cornea is but slight and the patient would rather have a part of the ball preserved, than to wear an artificial eye, we may, instead of performing the operation which we have just described, make a semi-circular incision through the inferior part of the cornea with a cataract knife, and cut off a portion of the flap with a pair of scissors. By this means, the eye will gradually become empty and shrink away, retaining, however, a certain size and all its motions.—The operation of excising a portion of the cornea, is also useful in cases of exophthalmia and dropsy of the eye.

PROCIDENTIA IRIDIS.

If the protrusion is recent, and has supervened in consequence of the operation of cataract, the only means of relieving it successfully, and without inconvenience, is to touch it with the nitrate of silver, because, at the same time that we destroy it, we cause an inflammation in the margins of the opening through which it passes, which produces an adhesion between the iris and the cornea. The caustic should be applied, at each time, only in such quantities as will be necessary to destroy a part of the tumour; and when this is removed to a sufficient extent, the application should be discontinued.

In recent cases of procidentia iridis, we should never have recourse to excision, for a new portion of membrane would soon follow the operation. This, however, is not the case when the tumour has supervened in consequence of opthalmia, is old, hard, insensible, and strangulated at its base, and appears to be supported merely by a very delicate peduncle. Under these circumstances, the operation may be performed without fear of another protrusion, and of producing an evacuation of the aqueous humour. When the excision is completed, one or two applications of the nitrate of silver will generally be sufficient to produce inflammation and union of the margins of the opening.

CLOSURE OF THE PUPIL.

The closure of the iris, or the extreme and obstinate contraction of the pupil, can only be remedied by establishing an artificial pupil. This may be done by several operations, one of which consists in making either a simple horizontal,* or vertical† incision into the iris; or in a crucial incision,‡ or in an incision made in the form of the letter V.§ the second in excising a portion of this membrane;|| and the third, in detaching the iris from a part of its circumference.¶

Amongst the different methods that are in vogue, that of Maunoir, which we shall presently describe, appears to deserve the preference. Scarpa acknowledges that it is superior even to the operation of detaching the iris from its circumference—an operation of which he is the inventor.

The simple incision of the iris, whatever may be its direction, has a tendency to occasion a return of the obliteration of the pupil, by the adhesion of its margins; and the operation of excision is not only difficult of execution, but it may give rise to inflammation of the eye, to a rupture of the

* Cheselden and Sir William Adams.

† Janin.

‡ Guérin.

§ Maunoir.

|| Wenzel, Demours, and Beer.

¶ Schmidt and Scarpa.

iris, and, when performed according to the method of M. Demours, it may tear the membrana crystallina.

The operation of detaching a portion of the iris from its circumference, is not only more painful than the incision, but it is frequently attended with an extravasation of blood, which is not always without inconvenience. The incision in the form of the letter V, presents none of these disadvantages, and is sufficient to make a large and permanent pupil.

OPERATION FOR ARTIFICIAL PUPIL, ACCORDING TO THE METHOD OF M. MAUNOIR.

Instruments.—The instruments which are required for this operation, are a cataract knife, and a pair of small delicate scissors, the blades of which should be about eight lines in length, and be slightly inclined towards the handle of the instrument. One of the blades should be perfectly sharp and pointed, and the other should terminate in a small probe-pointed extremity.

Operation.—In order to perform this operation, it is necessary that the patient should lie upon his back, with his head slightly elevated, and his eye-lids separated. If the state of transparency of the cornea will permit, the incision should be made through the inferior part of the membrane, or at its external side; if, on the contrary, there is only a single transparent point, the incision should be made through the opaque part.

Supposing, then, that the transparency of the membrane is such as to enable us to choose the place of incision, the operator should introduce the knife into the cornea at the side of the external angle of the eye,* a little less than a line from the sclerotica, and make an incision of about three lines in length. Through this opening the operator introduces the scissors, which should be closed, and carried in the direction of the transverse diameter of the iris. As soon as the point has arrived near the great circumference of this membranous septum, the blades of the instrument should be slightly opened, by directing them in such a manner that the pointed blade shall penetrate the centre of the iris, while the probe-pointed blade glides in front of the membrane as far as the point of union of the cornea and sclerotica. The section is then made by shutting the scissors; and immediately after, another is made so as to form an acute angle with the preceding, and make a flap, the apex of which shall correspond to the centre of the membrane.

In a few moments after the operation, the patient will be enabled to see distinctly the objects which surround him, in consequence of the retraction of the flap, which gradually re-

* See the operation for cataract.

cedes towards its base, and finally gives rise to the formation of a large and convenient pupil. M. Maunoir explains this phenomenon by the simultaneous action of the two fasciculi of muscular fibres, which he supposes to exist in the iris; one of which, the parallel fibres, extends from the circumference of this membrane towards its centre, and acts as a dilator muscle, and the other, the circular fibres, forms the small circle of the iris, and acts as a constrictor.

This method, though generally applicable, should not always be used where the establishment of an artificial pupil is indicated. Under certain circumstances, the detachment of the iris from its circumference, or the excision of a portion of this membrane, should be preferred to the operation which we have just described; but these cases must always be left to the judgment and discrimination of the surgeon. The operation, moreover, is not always so simple as it may perhaps appear from the preceding description, and the state of the aqueous humour, the iris, and the crystalline lens, may not unfrequently require modifications, and nice and delicate manœuvres, without which the success of the operation will be completely frustrated.

Thus the place of incision must always be determined by the opake spots of the cornea; and if there be any adhesions between the iris and that membrane, which will have a tendency to interfere with the new pupil, they should always be destroyed previously to commencing the operation. If there be a cataract, the lens should either be removed or depressed; and this should be done even when the lens is perfectly sound, for fear of its becoming opake after the operation, a circumstance which not unfrequently happens.

Whatever method may be adopted, for the purpose of making an artificial pupil, the surgeon should always bear in mind, that the chances of success are by no means very numerous; and with respect to the propriety of the operation, he should generally be influenced by the following considerations: 1st, when there is complete blindness in both eyes, which appears to depend uniformly either upon a closure of the iris, or upon the presence of opake spots on the cornea in front of the pupil, and when there is such a portion of sound cornea as to enable us to make the artificial pupil as large as it is in the natural state; 2ndly, when the patient, although blind, is able to distinguish some degree of light; 3rdly, when there is no alteration of the humours or the membranes, capable of destroying the success of the operation; and lastly, when the patient has no syphilitic or scrofulous symptoms, and his constitution is not deteriorated.—For an account of the treatment after the operation, see page 194.

CANCER OF THE EYE.

Although the extirpation of the eye in cases of cancer, is by no means an infallible resource, yet the examples of cure

are sufficient to authorize us to have recourse to the operation, provided there is no cancerous diathesis, or communication of the disorganization of the eye to the bones of the face, or to the brain and its envelopes.

EXTIRPATION OF THE BALL OF THE EYE, ACCORDING TO THE METHOD OF LOUIS.

Apparatus.—A pair of curved scissors, a straight pointed bistoury, tenaculum, pair of dissecting forceps, ligatures, a few compresses, and a roller.

Operation.—The patient being seated upon a chair, an assistant stands behind him, and steadies his head, by placing the right hand upon the forehead, and the left under the chin: two other assistants take hold of the arms, while the surgeon places himself in front of the patient, or on the side of the eye upon which he intends to operate. If the ball of the eye is alone affected, and it is intended to save the eye-lids, the operator should draw the integuments from within outwards, and introduce the bistoury held in the third position, flat and horizontally under the external commissure of the lids to the distance of about half an inch. The edge of the instrument is then carried forwards, and its point elevated in order to pass through the skin and divide every thing that is comprised between the point and the handle of the bistoury. This incision, which was recommended by Desault to render the extirpation more easy, is almost indispensably necessary when the ball of the eye has acquired considerable magnitude. As soon as it is made, the cornea should be taken hold of with a single or double hook, which must be held in the left hand, so as to enable the operator to pull gently at the ball of the eye. Then holding the bistoury in the first position, he plunges it into the internal angle of the eye, between the ball and the inferior lid, carries its edge upwards and outwards, and then outwards and inwards, and thus traverses the whole contour of the orbit, until he reaches the point where he commenced the incision. During this step of the operation, the assistant who steadies the head of the patient, should carefully elevate the superior, and depress the inferior lid. As soon as the eye is separated from its anterior attachments, it is merely held in its place by a kind of peduncle, formed chiefly by the optic nerve. This should be divided by means of the curved scissors, which are introduced either at the internal, or at the external side of the tumour, according to the convenience of the operator: and in order to facilitate their introduction, the tumour should be drawn forwards, and to the opposite side by means of the hook. When the eye-lids participate in the disorganization, they should be removed at the same time that we extirpate the eye. Here the first incision will be perfectly useless, and all that is necessary is to pass the hook from above

downwards through the free margins of the lids, taking care at the same time to make it pass through the anterior part of the ball. When the tumour is thus secured with the hook and drawn forwards, the operator plunges the bistoury into the eye-lid, between the parietes of the orbit and the ball of the eye, and terminates the operation as in the preceding case.

As soon as the ball is removed, the operator introduces the index finger into the orbit, in order to ascertain the state of the soft parts. If there be any alteration of the cellular tissue, it should be carefully removed, as well as the lacrymal gland, though it may be perfectly sound. In order to extirpate this gland, it is merely necessary to take hold of it with the tenaculum, and drawing it out as far as possible, to detach it with the scissors. If the periosteum of the orbit appears to be affected, it should be removed with a raspatory, as well as any cancerous portions of bone. When these occupy the inferior part of the orbit, they may, according to some, be destroyed with the actual cautery.

The hemorrhage which attends this operation may generally be arrested by the application of small pieces of lint: if the palpebral arteries, however, bleed profusely, it will be necessary to apply the ligature.

Instead of the ligature, nothing will be necessary but to take a pair of small forceps, and pinch the mouths of the arteries: by this means the hemorrhage will immediately cease, and the healing of the wound will be much facilitated.

When the operation is completed, the orbit is filled with lint, the eye-lids are brought into contact, and the lips of the wound, at the external angle of the eye, are maintained in apposition by means of strips of adhesive plaster. In case the eye-lids have been removed, all that will be necessary is to cover the wound with pledgets of lint.

The application of long compresses, extending obliquely from the zygomatic arch towards the forehead, and the monocular bandage, complete the dressing.

The wound should be examined in about four or five days; and the subsequent dressings should be of the same nature, and applied in the same manner as the first.—Whenever the surgeon inspects the parts and finds any fungous granulations, he should endeavour to destroy them either with the knife or the application of caustic.

The cicatrization, which is generally slow after this operation, would only be impeded, if, with the view of enabling the patient to wear an artificial eye, the surgeon were to endeavour to preserve an opening by keeping a ball of lint or some other foreign body in the orbit. The crescentic contraction of this cavity appears to be always an insurmountable obstacle to the use of an artificial eye.

CATARACT.

Various means have been employed to remedy the loss of transparency of the crystalline lens and its capsule, especially blood-letting, the application of cups, or blisters to the head or nape of the neck, and the use of electricity; but all these remedies are useless, and our hopes of success must entirely depend upon the removal of the crystalline lens from the axis of vision, when it has become a foreign body by its opacity.

Time for performing the operation.—Although the operation affords the only chance of success, yet its results are by no means always satisfactory. This circumstance, according to Professor Beer, may depend either upon the fact that the operation is sometimes performed without being positively indicated, or upon the choice of a method of operating which is not at all adapted to the species of cataract which it is intended to remedy. Before the operation is commenced, therefore, we should always carefully reflect upon the circumstances that may have a tendency to produce an unfavourable result, and take such precautions as are necessary to ensure success.

The operation, according to the same author, may be regarded as more or less unfavourable; 1st, When the patient is affected with the tetter, especially when it is owing to the scurvy; 2ndly, When there are evident signs of constitutional derangement; 3rdly, When the patient has been sick, and is still in a convalescent state; 4thly, When he is suffering from some other disease, even when it is of a local nature; and lastly, When the cataract adheres extensively to the uvea, or when there is a chronic and obstinate inflammation of the iris: it must necessarily be unsuccessful when the disease is complicated with amaurosis, glaucoma, a solution of the vitreous humour, hydrophthalmia, or a varicose state of the blood-vessels of the eye.

As a general rule, we should never operate so long as but one eye is affected, and the patient enjoys sight. This precaution, which is deemed unnecessary by some practitioners, is founded upon the apprehension that the inflammation of the eye that is operated upon, may extend to the sound eye, and produce severe injury in both.

When both eyes are affected with opacity of the crystalline lens, and the operation is indicated, ought we to operate upon both at the same time? This question, which has been a cause of considerable diversity of opinion amongst eminent surgeons, has generally been decided in the affirmative by the French. With respect to the time that we ought to operate for the cataract in children, most practitioners are of opinion that it should be deferred until the age of puberty; but the researches of Saunders, Ware, Gibson, and Lusardi, demonstrate the great advantages resulting from the depression of the congenital cataract before the twelfth month.

Choice of the operation.—The operation for the cataract may be performed in three different ways, by depression, extraction, and keratonyxis.

It would be improper to assert that any one of these methods is absolutely preferable to the others, because there may be cases where each of them may be more particularly applicable; the operation, therefore, of extraction and depression, which counts the greatest number of partisans, should be alternately performed, according to the circumstances of the case. The operation of depression should be preferred: 1st, when the eye is so prominent that we have reason to apprehend the escape of the vitreous humour through the incision, or when it is so hollow that it will be difficult to make the oblique incision of the cornea; 2ndly, when the pupil is very small, without adhering to the lens, and can not be sufficiently dilated, even under the influence of the extract of belladonna or hyocyamus; 3rdly, when the iris adheres to the cornea; 4thly, when the senile arch is very large, the eye-lids rather small, and the eyes continually agitated with involuntary movements; 5thly, when the cornea is very flat, and the anterior chamber so small that the knife can not be introduced without wounding the iris; 6thly, when there are one or more small wounds upon the cornea, which can not be avoided in making the incision; 7thly, when the eye-lids are everted or affected with chronic engorgement; and lastly, when on account of the age or character of the patient, we have no reason to expect that he will take proper care of himself after the operation.

Preparation of the patient.—In the ordinary cases of the disease, it will be sufficient to put the patient for several days upon a low diet, to request him to abstain from stimulants, especially from the use of spiritous liquor, and to administer a purgative. In plethoric persons, and in those who are particularly disposed to inflammation, most surgeons are agreed upon the employment of blood-letting, the use of pediluvia and diluent drinks; as well as upon the advantages of the application of a blister to the nape of the neck, some time before the operation, and upon the utility of such means as have a tendency to improve the health of hysterical females, and of weak and hypochondriacal persons. In individuals of this description Scarpa recommends the use of tonics, especially the infusion of the quassia amara, either alone or in combination with a little sulphuric ether, which should be taken about three weeks previously to the operation.

The inflammation of the eye must be carefully combated; and if the eye-lids are habitually red and swollen, and daily incrustated with a glutinous humour, it will be advisable, in addition to the discharge which should be established on the nape of the neck by means of a blister, to insinuate every morning and evening a small quantity of Janin's ointment between the lids, made weak by the addition of two or three parts of lard,

and to pour into the eye several times a day a few drops of some resolvent collyrium.

M. Dupuytren deems it extremely important never to operate during the prevalence of an epidemic coryza or ophthalmia. —When the pupil is very much contracted, it should be dilated by pouring into the eye a few drops of the aqueous solution of the extract of belladonna or hyocyamus, on the evening and morning before the operation. As this application, however, sometimes disposes the eye to inflammation, we should only have recourse to it in those cases where it is absolutely necessary.

Position of the patient and the operator.—In the operation of depression or extraction, the patient should be seated upon a low chair, and placed in front, and rather a little to the side of a clear window, so that the light can only strike the eye obliquely, in order that the pupil may preserve a certain degree of dilatation. The trunk and arms are to be secured by means of a large bandage, the ends of which should be tied to the back of the chair. The sound eye, or the one that is to be operated upon last, should be covered with a linen compress, which is to be secured by means of a bandage. This precaution is intended to prevent the eyes from moving about. As soon as these preliminary measures have been observed, the head of the patient is to be turned slightly backwards, and supported on the breast of an assistant, who steadies it by placing one hand under the chin or upon the covered eye, while, with the index and middle fingers of the other hand, he elevates the superior lid of the opposite eye. The extremities of the fingers should be applied so as not to touch the eye, but in such a manner that they may support the superior part of the organ, when it is turned upwards to avoid the instrument. It is extremely important that the person who is charged with this office, should be intelligent, and well acquainted with the nature of the operation: and in case no assistant of this kind can be procured, his place should be supplied by means of a speculum or elevator of the superior eye-lid.

In performing the operation, the surgeon should be seated upon a more elevated seat, in front of the patient, whose head should be on a level with his breast, and rest his elbow upon his knee, which is to be properly elevated by putting his foot upon a stool. In this manner, he will be able to carry his hand to the eye without effort, and execute the different movements that are required in the operation, with ease and safety.

Some practitioners prefer placing their patient upon a high chair, and to stand in front of him during the operation.

When thus placed, the surgeon depresses the inferior eyelid with the index and middle fingers, and proceeds to the operation.

OPERATION FOR CATARACT BY DEPRESSION.

The instrument necessary for performing this operation, is the cataract needle of Scarpa, or that of Dupuytren.

The method of Professor Dupuytren is extremely simple, and is worthy of being adopted.—The patient is requested to direct his eye a little inwards, and as soon as it becomes perfectly steady, the operator takes the needle in his right hand, provided he intends to operate upon the right eye, and vice versâ: the instrument must be held like a writing pen, its convex edge being turned forwards, its point backwards, and its handle directed horizontally towards the eye. The operator resting the extremity of his two last fingers upon the temple and the corresponding malar process, plunges the point of the needle into the sclerotica at the distance of a line and a half from the cornea, a little below the external extremity of the transverse diameter of the eye, and in a direction perpendicular to its surface; and, in proportion as it enters, the handle of the instrument, which was at first inclined backwards, is to be carried forwards, so as to describe a small portion of the segment of a circle. As soon as the point of the instrument is perceived behind the pupil, the surgeon carries the concavity upon the crystalline lens, depresses it slightly, and then inserting its point into the anterior disk of this body, he carries it downwards, outwards and backwards, below the vitreous humour. During this movement, the handle of the needle should be directed forwards, upwards and inwards. The portion of the instrument which corresponds to the membranes of the eye, remains immovable, and forms the centre of the whole movement. This being executed, and the pupil appearing perfectly clear, the instrument should be retained for a few instants in its situation, in order that the vitreous humour may recover its situation, and prevent the lens from rising.—*Med. Oper. de Sabatier. Nouv. edit. par MM. Bégin et Sanson.*

It is indispensably necessary to remove the capsule with the lens, although it may be perfectly transparent, because it will invariably, by its presence, give rise to a secondary membranous cataract. We should always, then, make it a general rule to tear away the whole anterior disk of the capsule before we depress the lens.

While the cataract is held in its depressed situation, we should ascertain whether the pupil is of a beautiful black; and if this be the case, the needle should be disengaged by means of some rotatory movements, and be withdrawn in the direction in which it was introduced. If, on the other hand, there are whitish flocculi, or opaque specks of the capsule in the pupil, they should be carefully removed from the visual axis, by pushing them into the anterior chamber by

means of the needle, which should never be withdrawn before they have entirely disappeared.

If the cataract be soft and lactescent, the incision into the capsule can scarcely be made before the fluid which it contains will be extravasated into the anterior chamber of the eye, and render the aqueous humour so turbid as completely to conceal the needle. In these cases it will be advisable to suspend the operation, and to wait until the extravasated fluid is completely absorbed.

If the cataract be soft, without being at all pulpy, Professor Scarpa is in the habit, after the capsule is torn, to break the lens into small fragments, and to throw them into the anterior chamber.

When the cataract adheres to the margins of the pupil, it should be separated by means of the needle carried between the iris and the lens, and then depressed.

If there be any adhesion between the crystalline lens and its capsule, and between the capsule and the membrana hyaloïdea, a circumstance which may occur when the crystalline lens has been depressed, and resumes its situation as soon as the needle is withdrawn, it will be advisable, according to Professor Scarpa, to introduce the edge of the instrument into the superior part of the posterior surface of the lens, and to destroy its adhesions by a few vertical movements.

It sometimes happens that after the operation for the cataract in which the capsule has not been completely destroyed, the portion of the membrane that has been left untouched, becomes opaque, and forms a secondary cataract. In these cases, the disease should be remedied by introducing the needle as in the operation of depression, dividing the opaque membrane, and detaching the flocculi with the point of the instrument. They should then be entangled by turning the handle of the needle between the thumb and index-finger, and pushed through the pupil into the aqueous humour, where they will be speedily absorbed.

Treatment after the operation.—As soon as the needle is withdrawn, the eye-lid should be suddenly depressed, without permitting the patient to look at any object, and the eye covered with a light bandage. The patient being put into a dark chamber, should be placed in his bed in nearly a sitting posture, or if he prefer it, he may sit in an arm-chair, in order that he may be able for several hours to observe the most perfect rest. The bandage, according to Professor Scarpa, should be removed on the third day: Beer recommends that the eyes at this period should be covered with nothing but a simple shade, which the patient should continue to wear for some time after the operation. Some surgeons are in the habit of prescribing, on the morning of the operation, a mild purgative, such, for instance, as the sulphate of magnesia; and if there supervene vomiting, head-ache, or other nervous symptoms, immediately after the operation, they may

be easily remedied, according to Scarpa, by means of an enema, composed of eight ounces of a decoction of camomile, and two grains of opium.

OPERATION FOR CATARACT BY EXTRACTION.

The method which is generally adopted in the operation of extraction, is a modification of that of Wenzel.

Apparatus.—Two of Wenzel's cataract knives, in case one of them should bend in making the incision of the cornea; a cystitome, or cataract needle; Daviel's curette; a pair of small scissors and dissecting forceps; a roller, two compresses, and a pledget of lint.

Position of the patient and the operator.—See page 191.

Operation.—*First step.*—*Incision of the cornea.*—The surgeon holding the knife like a writing pen, and in a horizontal direction, with the thumb, the index and middle fingers of the right hand, supposing that he intends to operate upon the left eye, applies the last two fingers against the external margin of the orbit, depresses the inferior eye-lid with the index and middle fingers of the left hand, and requests the patient to direct the eye a little outwards. Having done this, and taking care to embrace the moment when the eye is at rest, he carries the point of the knife into the superior and external part of the cornea, at the distance of one fourth of a line from the sclerotica, and in a direction perpendicular to the surface of the membrane.

As soon as the point has arrived in the anterior chamber, the operator should direct it forwards and inwards, by carrying the handle of the instrument backwards, in order to avoid wounding the iris, and continue the incision in a straight line from without inwards, and from above downwards, parallel with the surface of the iris, as far as the point of the cornea, diametrically opposite to that where it entered, that is, downwards, and inwards, and at the fourth of a line from the sclerotica. As the blade of the instrument gradually widens from the point to the base, and only cuts at its inferior edge, so does the incision, in proportion as the instrument is depressed, enlarge at the inferior part, and forms a semicircular flap in the cornea. This flap should comprehend a little less than the half of the circumference of this membrane; and in order that it may be perfectly neat and round, the edge of the knife should be directed downwards and forwards.

As soon as the incision is made, the assistant who holds the patient's head, lets the upper lid gently fall over the ball of the eye.

When the orbitary margin is very prominent, and the eye small and sunken, it will be impossible to make the incision so oblique; but, notwithstanding this, its direction should not be perfectly horizontal.

If, at the moment the knife enters the anterior chamber,

the eye rolls suddenly downwards and inwards, so as to conceal under the lid the portion of the cornea at which the point of the instrument is to come out, it will be necessary to hold it perfectly still, and to wait, in order to complete the incision, until the eye has recovered its position; for if the operation be continued, the incision will be entirely too small, because the point of the instrument will come out before it has reached the circumference of the cornea. If, on the contrary, the knife be slightly withdrawn, the wound which is no longer filled with the blade, will give rise to the discharge of the aqueous humour, and the iris, which is now deprived of its support in front, will approach the cornea, and entangle itself under the edge of the instrument, so as to be inevitably divided at the moment we complete the section of the cornea.

When the eye is only directed inwards so that the point may traverse both sides of the cornea, the instrument will serve to correct the position of the eye, and enable us to complete the operation.

If the iris, as we have already said, presents itself under the edge of the knife, we should wait a few seconds, in order to enable it to return, or make gentle friction upon the cornea with the index-finger, while the middle finger holds the inferior lid; and as soon as the iris is replaced, the incision should be completed by leaving the finger on the cornea, in order to support the eye and afford a fulcrum to the blade. If the iris, however, can not be removed from below the edge, we should withdraw the instrument, and, to complete the incision, make use of the scissors, one of the blades of which is to be introduced into the anterior chamber, while the other, being retained on the outside of the cornea, is supported upon the index-finger of the left hand, which serves to give the instrument its proper direction.

In case it is necessary to operate upon both eyes, most practitioners, after having made the section of the cornea of one eye, make it immediately upon the other, and then proceed to finish the operation on the first, as we shall presently describe.

Second step.—Incision of the capsule of the lens.—Wenzel was in the habit of making this incision at the same time that he made that of the cornea and with the same instrument; but we prefer the following method. The lids being carefully separated without pressing upon the ball of the eye, the surgeon takes the cystitome, in the manner of a writing pen, introduces it into the eye by elevating the flap of the cornea with its blunt hook, and directs its point towards the centre of the pupil. The inferior part of the capsule is then to be divided, and the instrument withdrawn. As soon as this is done, the superior lid should be slowly depressed, and the eye covered with a bandage in order to dilate the pupil, and enable the lens to pass into the anterior chamber. The operation on the other eye is to be accomplished in the same manner; and if the surgeon prefers using the needle, he should intro-

duce its convex edge under the flap of the cornea, which must be very slightly elevated, and break up the capsule by directing the concavity of the instrument backwards and its point towards the centre of the membrane. This being done, the instrument is to be withdrawn without altering its position.

Third step.—Extraction of the lens.—Both eyes having remained covered for one or two minutes, the surgeon gently elevates the superior lid in order to ascertain the position of the lens. If, as frequently happens, he finds it between the margins of the wound, he may remove it with the extremity of the cystitome or a blunt stylet. If, on the contrary, the lens is still behind the pupil, and the operator is convinced that this circumstance is not owing to the incision of the capsule being too small, he ought to favour its escape by directing the patient gently to move his eye. If this be not sufficient, Professor Beer advises that the inferior lid should be gently pressed against the ball of the eye with the extremity of the fingers by which it is depressed, to increase this pressure until the greatest diameter of the cataract is engaged in the pupil, and afterwards diminish it until the lens is completely expelled.—The cataract may also be drawn out by means of Daviel's curette or a small hook.

If the pupil, instead of being of a beautiful black, as is the case when there is no foreign body, appears to be obstructed with opake mucosities, formed by the liquor of Morgagni, or by the broken pieces of the lens, we should introduce the curette, and extract every thing that is contained in the capsule, taking care to avoid wounding its posterior disk, which might give rise either to the formation of a secondary cataract, or the discharge of the vitreous humour.

If the opake bodies which obscure the pupil are formed by the flakes of the membrana crystallina, and can not be removed with the curette, they should be taken hold of and extracted with the forceps.—In some instances it may be necessary to divide them carefully with the scissors.

Finally, if the crystalline lens adheres to the small circle of the iris, which may be ascertained by the complete or partial want of motion of the membrane, we should endeavour to detach it by means of a small sharp-pointed needle.

MR. GUTHRIE'S METHOD.*

Apparatus.—The apparatus which is required for this operation, consists of a large common cataract knife, and a double instrument contrived by Mr. Guthrie, one part of which is a cataract knife, of the shape of Wenzel's, and the other a silver blade of the same form, but larger and blunt.

Operation.—The patient being seated upon a chair, with

* By the translator.

his head resting against the breast of an intelligent assistant, the surgeon takes the cataract knife, and makes an opening into the cornea sufficiently large to admit the double instrument. The knife is then to be withdrawn, and the iris is to be pressed forwards against the cornea, the eye-lid being allowed to fall over it. Should the iris pass through the opening in the cornea, the protruded part will readily return to its place by gently rubbing the eye-lid with the finger, a handkerchief, or a piece of sponge. The eye-lid is now to be elevated, and the double knife passed through the opening, the silver blade being next the iris. As the silver point is larger than the steel, it easily raises the cornea and pushes back the iris, so that by alternately raising and depressing the point of the instrument, it is readily carried across the eye in front of the iris and pupil, until the silver point touches the inside of the cornea, either immediately opposite the point of entrance, or as much above or below as the operator may think proper. The thumb, which has hitherto been resting on or near the button screw in the handle, is now made to press it forwards, and to protrude in consequence the sharp steel blade through the cornea, when the instrument readily cuts its way out, and completes the section of the cornea. The rest of the operation is to be finished in the manner already pointed out.—*See Guthrie's Lectures on the Operative Surgery of the Eye.*

Treatment after the operation.—When the operation is completed, we may ascertain whether the sight is re-established, by permitting the patient to look at some object. This attempt, however, should rather be made at the end of three or four days. Before the eye is closed we ought to see whether the iris forms a hernia across the margins of the wound; and if it does, it should be returned to its natural situation, either by exciting it to contract by making gentle friction on the upper lid, or by pushing it back with the curette.

We should likewise endeavour to prevent the inferior lid from becoming entangled with the flap, which is so much the more to be apprehended as the incision is large and less oblique: To effect this, the lid should be carefully depressed, drawn gently forwards, and enabled to resume its natural situation, so as to cover the whole incision of the cornea, without interposing between its margins.

The dressing consists in covering the eye with a pledget of fine linen, spread with cerate of the acetate of lead, and a monocular bandage, or a compress secured by means of a roller. When the dressings are applied, the patient must be confined to his bed in a dark room, with his head and chest considerably elevated, and observe the most perfect rest for eight or ten hours. The bandage should be removed every morning, the margins of the eye-lids should be carefully washed, and the inferior lid drawn gently downwards, in order to destroy its tendency to inversion. The patient should confine himself to the use of diluent drinks, to mild and digestible food, and if

costive, take a gentle purgative. On the fourth day, he may sit up for a few moments; on the fifth, he may leave his bed during the greater part of the day, and have his eye carefully examined. At this time, the cicatrization of the cornea will generally be far advanced.—The dressings should now be laid aside, and the light gradually admitted into the apartment; though the patient ought not yet, for some time, expose himself to a strong light without wearing a shade. The patient will generally be obliged to wear convex glasses in order to remedy the weakness of sight, which is caused by the absence of the crystalline lens. It is needless to observe, that if there be any inflammatory symptoms, in consequence of the operation, they should be speedily combated.

PTERYGIUM.*

The pterygium is a preternatural, thin, triangular, membranous expansion, which commonly occupies the internal angle of the eye, and gradually extends over the cornea, so as to encroach upon the sight.

In the early stage of pterygium, while the membrane continues small, and does not extend over the cornea, it seldom requires surgical aid. When, however, the pterygium has acquired a considerable size, and is productive of much irritation, it should be removed with a pair of curved scissors or a small scalpel. In performing the operation, the patient is to be seated upon a chair, and his head is to be supported by an assistant, who with one or two fingers elevates the upper eyelid, while another assistant depresses the lower lid, and keeps it fixed. The surgeon then takes a pair of small forceps, elevates the pterygium from the conjunctiva, and detaches it by means of the scissors from the delicate cellular tissue by which it is connected to the subjacent parts. When the operation is finished, the bleeding should be promoted by washing the part with warm water, and the eye should be simply covered with a wet compress and light bandage.

ENCANTHIS.*

Encanthis is an enlargement of the caruncula lacrymalis and the valvula semilunaris of the conjunctiva.

So long as the encanthis remains small, and does not create much pain and irritation, it will seldom be necessary to resort to an operation. When, however, it becomes large and inveterate, and is a frequent source of suffering, it should be removed by means of the knife. In performing the operation, the patient is to be seated upon a chair, with his head reclining

* By the translator.

on the breast of an assistant, who turns out the inside of the upper eye-lid, so as to expose the tumour. The surgeon then takes hold of the encanthis with a small hook or pair of forceps, and dissects it out by means of a small bistoury; care being taken not to interfere with the puncta lacrymalia.

When the operation is finished, the eye is to be covered, as in the preceding case, with a thin wet compress and a light bandage.

HORDEOLUM.*

The hordeolum, or stye, is a red, painful tumour, which projects from the edge of the eye-lids, and is similar in many respects to the common bile.

This affection is often so slight as to require but little attention; but when it becomes painful, and is a source of much uneasiness, recourse should be had to emollient anodyne applications, and to the administration of mild purgatives. After suppuration has taken place, the dead cellular substance which occupies the centre of the tumour, may generally be detached, and the wound will soon heal. Care should always be taken, as recommended by Scarpa, never to be in too much haste to let out the serous fluid, which exists between the skin and dead cellular tissue, but rather to wait for its spontaneous removal. When this, however, is slow in taking place, it will be proper to compress the base of the hordeolum, and force out its contents. If, after the pain and inflammation have subsided, the tumour become indolent and stationary, a cure may frequently be effected by the application of the nitrate of silver, or the point of a camel-hair pencil, dipped in sulphuric or nitric acid.

ALBUGO.*

The albugo is a deep-seated opacity of the cornea, of a white or pearl colour, and is often unaccompanied by ophthalmia.

In the recent state of the disease, a cure may frequently be effected by the application of slightly astringent collyria, such as are calculated to promote the absorption of the nebulous speck. For this purpose Scarpa strongly recommends the following lotion:

R. Ammon. muriatæ,	℥i
Cupri acetati,	gr.ij
Aq. calcis,	℥iv: mix.

He speaks also highly of the unguentum opthalmicum of Janin, and of an ointment composed of the following ingredients:

* By the translator.

℞. Tutia prepar.	ʒi
Aloes. s. p.	gr.ij
Hydrargyri submur.	gr.ij
Adipis suillæ,	ʒss: mix.

When the albugo, however, is of long standing, it will always be necessary to resort to highly stimulating applications. "One of the best of these," says Professor Gibson, "is the unguentum hydrargyri nitrati, applied by means of a camel-hair pencil to the surface of the speck once or twice a day. In several obstinate cases of the disease which have resisted all the usual remedies, I have known a speedy absorption of the speck accomplished by the repeated ablation of the eye and eye-lids with diluted vinegar. The practice originated, I believe, with Dr. John K. Mitchell, of this city. In addition to the local treatment, the internal use of calomel and other preparations of mercury should be resorted to."—See Gibson's Surgery, vol. ii. p. 177.

PARACENTESIS OCULI.*

This operation, which is sometimes necessary in cases of hydrophthalmia, and collections of purulent matter in the cavity of the eye, may be performed with a common lancet or couching needle, care being taken to repeat it as often as the circumstances of the case may require.

WOUNDS OF THE NOSE.

As all kinds of wounds of the soft parts of the nose are extremely apt to be attended with deformity, the surgeon should always endeavour, if possible, to unite them by union of the first intention. The flaps, though they may adhere only by the smallest possible portion of skin, should be carefully brought into contact, and maintained in this position by the application of strips of adhesive plaster, or by a few sutures. The parts should be prevented from sinking, or falling in, by filling the nostrils with dossils of lint, care being taken that a gum-elastic catheter be previously introduced to facilitate the passage of the air: it will be proper also to apply linen compresses to the sides of the nose, in order to prevent the bandage from creating deformity.

If there be a fracture of the bones of the nose, with a depression of the fragments, they should be replaced by introducing a female catheter into the nasal fossæ, or a pair of dressing forceps, which should be used as a lever for the purpose of elevating the bony pieces, while the index finger of the left hand prevents them from being pushed too far out. When the

* By the translator.

bones are properly adjusted, they have generally but little tendency to become again displaced. If this, however, should occur, we should endeavour to support them by keeping a catheter in the nasal fossæ.

The external wound, which is generally contused, must be carefully dressed, and the dressings secured by means of a T-bandage.

DOUBLE T-BANDAGE FOR THE NOSE.

This bandage consists of a roller about a yard in length and one inch in width, and of two pieces of cloth, each about eighteen inches long, and of the same width as the preceding, upon the middle of which they should be sewed by one of their extremities, at the distance of six or seven lines from each other, so as to form a right angle.

Application.—The middle of the transverse roller should be applied upon the superior lip, and the other two should be directed upwards. The surgeon then takes the extremities of the first roller into each hand, and carries them over the cheeks, below the ears, as far as the nape of the neck, where they are tied into a simple knot. The two perpendicular rollers should then be carried over the sides of the nose, and after they have been crossed in front of the root of that organ, they should be passed behind the ears upon the transverse roller to which they should be attached.

Wounds of the nose, like all those which occur in the neighbourhood of the base of the cranium, are frequently complicated with cerebral symptoms; and when this is found to be the case, they should be treated in the same manner as wounds of the head.

EPISTAXIS.

The surgical treatment of epistaxis consists chiefly in the complete occlusion of the anterior and posterior nasal fossæ from which it proceeds. This mode of treatment, however, should never be resorted to unless the hemorrhage is profuse, and has resisted the use of injections of cold water and vinegar, cold applications to the nose, pressure with the fingers, warm pediluvia, and other means calculated to arrest the effusion of blood.

OPERATION OF PLUGGING THE NASAL FOSSÆ.

Apparatus.—The instruments which are required for this operation are Bellocq's canula, or in case this can not be procured, a thin narrow piece of whalebone; and several tampons or plugs made of linen, and having each a strong ligature, about eighteen inches long, firmly attached to its centre.

Bellocq's instrument consists of a silver canula, about six inches long, straight at the upper extremity, and slightly curved at the lower. Within its cavity is contained a watch spring, attached to a silver stylet, which may be pushed forward or retracted at pleasure. The inferior extremity of the spring is covered with a small silver bulb, which is perforated, and serves to convey the ligature. The upper end of the canula is furnished with a ring, which enables the surgeon to hold and steady the instrument.

Operation.—The patient being seated upon a chair in front of a window, with his head supported on the breast of an assistant, the surgeon takes the canula, which should be previously oiled, and introduces it into the nostril through which the blood escapes, by directing its concavity downwards; and as soon as it has arrived in the pharynx, he pushes at the stylet until it reaches the back part of the mouth, where it may be easily grasped with a pair of forceps, or the fingers. The two ends of the ligature, to which the tampon is attached, having been previously secured to the bulb of the stylet, the surgeon withdraws the instruments, and pulls the thread into the nasal fossa, and with it the tampon, with which is intended to block up the posterior naris. The ligature should then be given to an assistant, who draws it forwards, while the surgeon introduces a few dossils of lint into the anterior nostril, and places another tampon between the two ends of the ligature.

Four days after the operation, the dossils of lint may be removed, and the discharge of the coagula promoted by injections of warm water.

FOREIGN BODIES IN THE NOSE.

Foreign bodies in the nose should be extracted as speedily as possible, especially when they are of such a nature as to be capable of increasing in size.

If the foreign body be situated rather deeply, it may be disengaged by means of a curette, which is always preferable in these cases to the forceps, especially when the extraneous body is round.

If it can not be withdrawn through the nostril, it should be carefully pushed into the fauces, taking care not to let it fall into the larynx, or œsophagus. If, on account of its immobility, or the irregularity of its surface, however, it can not be pushed back without fear of injuring the pituitary membrane, we should endeavour to extract it by breaking it into fragments; but if this attempt should also fail, it will be necessary to enlarge the nostril by making an incision at the junction of the nose and cheek.

POLYPI OF THE NASAL FOSSÆ.

Cauterization, excision, extirpation, and the application of the ligature, have all been recommended and employed for

the destruction and removal of nasal polypi. Each of these methods has its advantages and inconveniences, and the application of each may be found more or less frequently necessary, according to the nature and circumstances of the case.

The application of the actual or potential cautery, which is generally rejected on account of the dangers with which it is attended, is sometimes the only means from which we can expect to derive any advantage. Richter relates a case of this kind, where the polypus was globular, hard, and resisting, and could never be touched without bleeding: its base was extremely large, and could neither be embraced by the ligature nor the forceps. The same may be said with respect to those cases of polypi which are complicated with cancerous degenerations and caries of the surrounding bones.

The operation of excision, though it is liable to dangerous hemorrhage, should be performed when the polypus can not be removed by extirpation, or the application of the ligature, or when the chances of these operations are unfavourable, and promise but little advantage; as when, for instance, the polypus fills the whole nasal fossa, and projects through the nostril, as in the case related by Ledran, in which he had recourse to this operation. Neither of these methods, however, is preferable, except in very rare cases, to the application of the ligature and the operation of extirpation, which are generally more frequently indicated, and more certain in their effects.

LIGATURE OF POLYPI OF THE NASAL FOSSÆ.

This method is at present generally abandoned by surgeons, 1st, because it is only applicable to pedunculous polypi at the inferior part of the nasal fossæ; 2ndly, because it is frequently followed by swelling and inflammation of the tumour, which are, in many cases, accompanied by severe symptoms, especially by difficulty of deglutition and respiration, violent fever, and an extension of the inflammation to the surrounding parts; 3rdly, because its effects are slow, and great difficulty is frequently experienced in the application of the ligature; and lastly, because it may happen that the tumour may become detached during sleep, and fall upon the larynx so as to impede respiration. Some practitioners, however, prefer it; and the mode of operating varies according to the nature of the polypus.

If the polypus occupy the anterior part of the nasal fossæ, we may expect to be able to tie it with advantage, provided it be near the nostril, and not so large as to prevent the introduction and play of the instrument in the nose.

The ligature may be carried round the base of the tumour, either with the double canula of Levret, with Heister's needle, or with a pair of forceps that have a hole at their extremity. The last method is the most simple, and ought always be preferred, unless something prevents its employment. It consists

in passing a ligature, previously waxed, through the two openings of the instrument, which is to be closed and carried as far as the root of the tumour, between it and the corresponding wall of the nasal fossa. The surgeon must then separate its blades in such a manner that one of them shall remain at the side of the base of the polypus, while the other is passed over its summit, in order to embrace the opposite side: the forceps are next withdrawn, so as to leave the noose around the tumour. The ligature should then be tied into a double knot, as near as possible to the root of the polypus, either by means of the fingers, or a double canula.

The method of Heister may be adopted when the polypus is situated deeply in the nasal fossæ, and is inserted into its lateral parietes. It consists in carrying a ligature around the peduncle of the polypus, by means of a curved needle mounted upon a handle, and pierced near its point, like the needle which has been recommended by Goulard for securing the intercostal artery, and then tying it into a double knot. A new ligature is to be applied, if the tumour does not fall off on the second or third day after the operation.

The method of Levret consists in placing a ligature round the base of the polypus, by means of his *porte-nœud*. See p. 28.

When the polypus is developed in the posterior part of the nasal fossæ, and projects into the pharynx, recourse should be had to the method of Brasdor, which, under these circumstances, possesses great advantages, and is performed in the following manner.

Apparatus.—1. Bellocq's instrument. 2. The double canula of Levret. 3. A silver wire, about eighteen inches long, formed into a loop at its middle, and having a ring at each extremity, so as to admit a strong piece of twine from three to four inches in length, the ends of which should be tied together. 4. Another piece of twine, which should be well rubbed with wax, and passed through the metallic loop.

Operation.—Every thing being prepared, the patient is seated in an arm-chair, with his head turned back, and leaning on the breast of an assistant. The surgeon standing before him, introduces Bellocq's canula, in the manner pointed out at page 203, fixes the piece of twine which is attached to the ends of the wire, to the bulb of the instrument, withdraws the stylet, and then the canula itself, which thus draws the ligature into the nose, and through the back part of the mouth. The operator then separates the ligature from the bulb of the canula, and pulls at it until the two extremities of the silver wire have passed through the naris, and the noose is in the mouth. He then carries one of his index-fingers into the back part of the mouth, and fixes the noose in its proper place.

In order to ascertain whether the tumour is properly embraced by the noose, the surgeon should pull at the ends of the wire; and if they do not advance, which is a sign that every thing is right, he should introduce them into the double

canula, pushed as far into the nostril as possible, and secure them to the rings of the instrument. The wire should then be gently twisted by turning the canula, so as to compress the peduncle of the tumour. The instrument being left in its place, should be secured to the patient's night-cap, in order to be enabled to use it for twisting the wire, in proportion as the noose becomes relaxed by the strangulation of the parts which it embraces. The canula, however, should not be left in the nose, but should be withdrawn as soon as the wire has been twisted, and again introduced when it becomes necessary to repeat the operation.

As soon as the tumour begins to be divided, and there is a discharge of fetid matter, we should make use of injections of alum, of the chloride of soda, or of any other detersive fluid, and endeavour to remove it as soon as it is sufficiently detached.

EXTIRPATION OF POLYPI OF THE NASAL FOSSÆ.

The operation of extirpation is much more frequently resorted to by surgeons, than the application of the ligature, because it is not only more easy of execution, but it is applicable to almost all cases of polypi, and enables us to remove every part of the tumour, and is sometimes perfectly successful.

The operation is performed with a pair of straight or curved polypus-forceps, the blades of which should be rather rough internally, and be neither too thin nor too sharp.

The patient being placed as in the operation for applying the ligature,* the surgeon takes the forceps into the right hand, like a pair of scissors, and carries them into the nose, by separating their blades, as far as the root of the polypus. As soon as they have arrived there, the operator closes them, and having ascertained that the tumour is well embraced by the instrument, he makes it perform the simultaneous movements of rotation and of traction, which should never be done with violence or rapidity. When the polypus becomes elongated, so as to project through the nostril, another pair of forceps should be carried still nearer to its root, and the movements, to which we have just alluded, should be continued so as to tear it rather by twisting than by pulling, in order to avoid, as much as possible, wounding the mucous membrane of the nose, and to prevent or lessen the hemorrhage.

The extirpation of the tumour is immediately followed by a profuse flow of blood; but this generally ceases of itself or by the employment of simple injections of cold acidulated water, especially when the polypus is completely removed. If the tumour, however, is torn by the efforts of the instrument, the hemorrhage will be more profuse and difficult to be arrested. In

* See page 205.

this case, the best and most expeditious means of checking it, is to remove the remaining parts of the polypus; but if, notwithstanding this, the hemorrhage still continues, recourse should by all means be had to the operation of plugging the nose.

If the polypus be too large to be seized with the ordinary forceps, we should endeavour to remove it by means of an instrument resembling a pair of midwifery forceps, the blades of which should be introduced separately, and then locked.

If the tumour be developed in the back part of the nasal fossæ and forms a considerable projection in the pharynx, it should be extracted through the mouth. To effect this the surgeon should carry the curved forceps as far back into the mouth as possible and conduct the operation in the manner we have already pointed out, taking care, however, not to irritate the base of the tongue. If we are able by this means to extirpate only a part of the polypus, we should extract the rest through the nose.

If the tumour be large, and the velum pendulum palati is so much distended by it as to impede the movements of the operator, we should adopt the advice of Manna, and make an incision through the velum pendulum palati, extending from its free margin to the bones of the palate, by means of a bistoury, the blade of which should be covered with a piece of linen to within a short distance of its point.

Professor Dupuytren is always in the habit, whatever may be the nature and situation of the polypus, to place two fingers in the back part of the mouth in order to support the tumour and to push it, as it were, into the forceps introduced into the nose. In case the polypus is seated in the anterior parts of the nasal fossæ and is too large to admit of being removed through the nostril, the Professor recommends making a large incision through the ala nasi, in order to facilitate the removal of the tumour.

If the polypus grows in several directions, projects through the anterior and posterior nasal fossæ, and penetrates into the maxillary sinus, it will be necessary to perform two operations: one of which consists in extirpating the portion of polypus in the maxillary sinus, after having perforated the wall of this cavity, or the opening which has been made by the tumour; the other, in removing the tumour which occupies the nasal fossæ, by the means which we have already indicated.

Before we proceed to the extirpation of such polypi, we should always guard against hemorrhage, which is sometimes considerable. Every thing, therefore, that is necessary for plugging the nose, or for applying the actual cautery, should be at hand, so that if there should be any hemorrhage, it may be immediately arrested.

Surgeons have sometimes endeavoured to extirpate polypi with the fingers, to which instruments could not be applied with any advantage. This was done in the case related by Morand, where the polypus was seated very deeply and

could not be extirpated with the forceps: he carried the index-finger of one hand upon the anterior part of the tumour, while that of the other hand was introduced through the mouth upon its posterior parts, and then by pressing it alternately forwards and backwards, he finally succeeded in detaching it.

When the operation is completed, the surgeon should carefully examine whether he has left any part of the tumour, and if he finds this to be the case, he should remove all such portions as may have escaped the instrument. The ease with which the patient respires, and the narrowness of the part by which the polypus adhered, generally suffice to show whether the tumour has been entirely removed. If, however, there be any doubt upon this subject, the introduction of a probe will soon convince us.

OZÆNA

The term *ozæna* has been applied to several diseases of the nasal fossæ, or of the maxillary sinus, the common symptom of which is an exhalation of a fetid odour through the nostrils. The means that are calculated to combat the disease, vary according to the affection to which it gives rise.

If the *ozæna* is essential, that is, if there is an ulceration of the pituitary membrane, or simply an alteration of its secretion, without any apparent lesion, we should endeavour to ascertain its nature, which, according to some, may be either syphilitic, scrofulous, herpetic, or scorbutic, and make use of a proper constitutional method of treatment; taking care at the same time, if the circumstances of the case require it, to employ local applications, such as injections of the preparations of zinc, copper, arsenic, mercury, or two or three grains of calomel, either alone or mixed with an equal quantity of liquorice powder. In order to destroy the fetid smell, which is sometimes almost insupportable, we should recommend the patient to cleanse his nose several times a day by snuffing up either some tepid aromatic water, or, what is still better, a concentrated solution of the chloride of soda, the use of which, though it has never been recommended in the disease before us, may prove of the greatest benefit. These last means, which can merely palliate the disease, are the only resources which remain to be put in practice when the first have failed, and there is a caries of the bony parietes of the nasal fossæ.

If there is an accumulation of matter or of altered mucus, in the maxillary sinus, we should employ, in addition to the preceding mode of treatment, such means as will have a tendency to evacuate the fluid and to prevent the caries of the maxillary bone and the formation of a fistula.

In some instances, the extraction of one or more of the teeth of the upper jaw, will be sufficient to answer this purpose, pro-

vided the alveolus communicates with the sinus; but under ordinary circumstances, we are obliged, at the same time, to enlarge the opening with a perforator.

As all the superior molar teeth, except the first, correspond with the sinus, it is of little consequence which of them be extracted. The third or fourth, however, provided they are all sound, should be preferred, because the osseous lamina, which forms their alveoli is extremely thin, and the perforation is consequently more easily executed.

In performing this operation, the patient should be seated upon a low chair, with his head resting against the breast of the surgeon, who introduces a pointed perforator into the alveolus, and cautiously enlarges the orifice by moving the instrument between the thumb and fingers. If the opening which is thus made, is sufficiently large, it will enable the accumulated matter to pass with facility; if it be too small, however, it should be enlarged by means of a larger perforator, or a pair of strong scissors.

When the operation is completed, the surgeon should fill the opening with a ball of lint, through which, if it be desirable, he may introduce a piece of gum-elastic catheter, and make use every day of injections of tepid water or of some detersive fluid, according to the circumstances of the case. The opening will gradually contract and close of itself, as well as the fistulæ which may exist in its neighbourhood, and will not require any particular attention.

When it is impossible from the peculiar nature of the case, to open the sinus at the place just mentioned, the surgeon may adopt the advice of Desault, and make a perforation in the inferior part of the canine fossa.

POLYPI AND OTHER TUMOURS OF THE MAXILLARY SINUS.

In order to destroy these tumours, it is necessary to expose them by opening the maxillary sinus, either through the alveolar margin, or the canine fossa, in the manner we have already pointed out. When this has been done, the operation must be performed differently, according as the tumour consists of soft parts, like polypi and fungi, or of osseous tissue.

The French surgeons are in the habit, after having removed or excised these tumours, to destroy the remains by means of the actual cautery.

ABSENCE OF THE NOSE.

This shocking deformity may be remedied in two ways; either by making an artificial nose, or by forming a new organ, by means of the living tissues. Artificial noses should be made of paste-board, caoutchouc, metal, or, what is still better, of finely prepared cloth; they should bear a perfect resemblance to the natural nose, and should be carefully adapted to the

sinuosities of the face with which they come in contact. They must be maintained in their proper situation, by securing them to a pair of spectacles, which should be so disposed as to rest firmly upon the temples, or by means of springs fixed in the nasal fossæ.

In order to form a nose by means of the living tissues, surgeons have recommended several methods; but if any of them deserve a preference, it is unquestionably that which has been generally adopted in India, and which has lately been successfully employed by Lucas, Carpue, and Delpech, and a successful case of which has recently been presented to the Academy of Sciences by Lisfranc, in which the individual on whom he operated, had not only lost the bones and cartilages of the nose, but even a part of the nasal process of the superior maxilla. It may not be improper, therefore, to give an account of this method as modified by the surgeon of the hospital de la Pitié.

RHINOPLASTIA.

1. The surgeon commences with introducing into the nose the middle of a square compress, the cavity of which should be filled with a sufficient number of dossils of lint to form an eminence of the size and figure of the nose. The edges of the compress are then to be folded over the lint, and maintained in contact by a few stitches.

2. The surgeon then takes the size of the new nose with a piece of paste-board: this pattern, which must necessarily be nearly of a triangular form, is applied upon the forehead, in such a manner that its large angle shall rest between the two eye-brows parallel with the mesian line. In cutting it, care should be taken to make it a third wider than the extent of the new nose, in order, as M. Lisfranc observes, "that the internal surface of the flap of the skin with which the nose is to be formed, may, by cicatrizing with itself to a sufficient extent, become double and acquire a considerable degree of consistence and solidity, especially when its thickness is augmented by the development of a great number of fleshy granulations."

3. Around this triangular piece of paste-board, the base of which should be surmounted, at its middle part, by a prolongation so as to answer the purpose of a septum nasi, the surgeon should draw a line with a piece of the nitrate of silver, cut into a point and dipped in a little water. This line should terminate on each side upon the inferior part of the nasal process of the os frontis, the point where the flap should remain adherent; it should be prolonged, however, about three lines lower on the left than on the right side, in order to avoid the inconveniences which would result from the twisting of the apex of the flap.

4. The flap which is thus marked, should be detached by making an incision through the skin of the forehead, about a

line beyond the course of the mark, in order that the retraction which takes place after the dissection has been made, may not render the flap too narrow.

5. The margins of the opening in the nasal fossæ, should then be pared away by making a perpendicular incision through the skin, and the lips of the wound should be dissected so as to form a groove to receive the borders of the new nose.

6. The surgeon then brings down the large cutaneous flap from the forehead, and after having twisted its apex, in order that the bloody surface may be turned towards the nasal fossæ, he introduces its margins into the groove which was made during the preceding step of the operation. When it is properly adjusted, it should be secured by means of light strips of adhesive plaster.

When the cicatrix has acquired sufficient solidity, and the foreign bodies in the nasal fossæ have been withdrawn, the surgeon should endeavour to form a septum nasi, by making an incision into the upper part of the superior lip, and introducing into it the prolongation at the base of the large cutaneous flap.

As soon as the operation is finished, the surgeon should endeavour to approximate the lips of the wound of the forehead as closely as possible, and maintain them in contact by strips of adhesive plaster: and though there will be a very apparent cicatrix, yet, if the dressings be properly applied, there will be little deformity.

HARE-LIP.

This deformity can only be remedied by means of an operation, which consists in paring away the edges of the open fissure, and in producing their union by means of the suture or by strips of adhesive plaster and the uniting bandage.

This operation has been successfully performed upon children of every age; but as it is often attended with convulsions in very young subjects, we should never, as a general rule, have recourse to it before the child is two years of age. Yet, notwithstanding this, we are authorized to perform the operation much sooner when the deformity is of such a nature as to prevent the child from using the breast. The operation always differs according as the hare-lip is simple or complicated, single or double; and before we proceed to its performance, we should always carefully ascertain whether there be any adhesions between the lip and the gums, and if this be the case, they should be destroyed with the bistoury. If the incisor teeth project so far as to prevent the approximation of the edges of the fissure, they should by all means be removed. A slight projection, however, of the alveolar margin requires no particular attention, as it generally disappears of itself after the operation.

Having carefully attended to these preliminary measures so

as to render the hare-lip simple, we may then proceed to the operation.

OPERATION FOR HARE-LIP.

Necessary instruments.—A very strong, sharp bistoury; a pair of curved scissors, with sharp sloping edges; a thin piece of wood, horn or paste-board, about five lines in width, and about three inches in length;* two or three straight, cylindrical needles, of gold or silver;† and two ligatures.

Dressing apparatus.—Several small dossils of lint, to be placed under the extremities of the needles; a roller, about three inches wide, and two yards and a half long; a split bandage, three inches wide, and one yard in length; two graduated compresses, so thick that when they are placed upon the cheeks, they shall prevent the uniting bandage from touching the needles; a bandage as wide as the lip, being from three to five yards in length, and rolled up into two heads; and a four-tailed bandage, about three feet long, and from seven to eight inches wide.

Operation.—The patient is to be seated upon a low chair, before a window, or if it be a child, he may be placed upon the knees of a person and held perfectly quiet. His head is to be supported on the breast of an assistant, who applies his two hands upon the cheeks in such a manner as to approximate the fragments of the divided lip. The surgeon then separates the lip from the gums, provided there be any adhesions, by dividing the mucous membrane by which they are united, beyond the point of union of the two incisions, and then proceeds to excise each edge of the fissure of the lip, in the following manner.

If the surgeon intends to operate with the bistoury, he should carry the piece of wood or horn under the right part of the lip, beyond the angle of the fissure, and hold it by placing the index and middle fingers behind it, while the thumb presses upon the lip. Then holding the bistoury as in the incision from without inwards, he plunges the point a little above the angle of the fissure, and makes a straight incision, with a single stroke of the instrument, through the entire thickness of the parts. When this incision is completed, he places the piece of wood or horn under the left side of the lip, which he steadies, on the one hand, by applying the thumb upon the inferior part of the edge which he is about to excise, and on the other, by requesting an assistant to apply one of his fingers upon the left side of the fissure.

* Instead of this instrument, the surgeon may use a pair of forceps with flat blades, one of which, being larger than the other, is carried under the lip, while the other remains on the outside, and serves as a guide to the bistoury.

† The gold needles should be preferred on account of their not being liable to become oxidized.

In operating with the scissors the surgeon takes hold of the right side of the lip at its inferior part, with the thumb and index-finger of the left hand, and placing the edge of the fissure between the two blades, removes it at a single stroke of the instrument through its whole extent. The same operation should be performed on the opposite side, taking care that the two incisions exactly correspond, and terminate at the same point of the angle of the wound.

If the division of the labial artery give rise to such a degree of hemorrhage as to interrupt the operator, an assistant should compress the vessel where it passes over the body of the inferior maxilla, until the edges of the wound have been brought into contact, when it will generally cease spontaneously.

To effect this union, the surgeon should introduce the needles, by commencing at the inferior part of the wound, in order that the two parts of the free margin of the lip may be exactly on a level. He should take hold of the inferior part of the left side of the wound with the thumb and index-finger of the left hand, and introduce one of the needles near the free margin of the lip, at the distance of about two lines from the bleeding edge, by directing it obliquely from below upwards and from before backwards. As soon as it appears on the surface of the wound, leaving before it about two-thirds of the thickness of the lip, the operator takes hold of the right part of the fissure and introduces the point of the needle into its bloody edge, by directing it from above downwards and from behind forwards, until it comes out at the point corresponding to that at which it entered. By this means the needle describes a curved line, the concavity of which presents downwards, renders the portion of the lip which is situated below it, prominent, and forms the little projection which exists at the middle of the free margin of the superior lip, or at all events prevents this margin from presenting any fissure.

When the first needle is introduced, the surgeon passes a fine ligature once around each of its extremities, and gives the ends to an assistant, who draws them equally in order to extend and approximate the edges of the wound.

The second needle is then to be passed immediately below the angle of the incision, and, if it be necessary to have another, it should be introduced in the middle of the interval which separates the two preceding. Each of these needles should be directed horizontally so as to enter and pass out at the same distance from the bleeding edge as the first, and penetrate to the same depth.

In order to be convinced that the edges of the wound will be carefully approximated, some surgeons are in the habit, after having properly adjusted the parts, of marking with a pen the point where the needle ought to enter and pass out.

When all the needles are introduced, the operation is completed by winding a strong ligature repeatedly around the inferior needle, first transversely and then obliquely, so as to form

two or three figures of 8. The ends of the thread are then to be directed upwards, crossed in the interval which separates the two needles, and secured in the same manner as in the preceding case. In this manner the surgeon continues to cross them in the form of the figure of 8 or the letter X, by re-descending, if requisite, towards the inferior needles, in order that when they are properly applied, they may cover the whole extent of the wound. When this is done, the surgeon ties the ends of the ligature into a simple knot, and takes care that the loops shall produce such a degree of compression, as to keep the lips of the wound slightly in contact. If the loops are drawn too tightly, they will have a tendency to give rise to inflammation, ulceration or even gangrene of the parts which they unite.

Dressings.—When the operation is finished, the ends of the pins are to be supported by small dossils of lint, placed between them and the skin; and the action of the sutures is to be promoted by applying the following bandage; but in cases of very young infants, a preference should always be given to strips of adhesive plaster.

UNITING BANDAGE FOR VERTICAL WOUNDS OF THE SUPERIOR LIP.

Having covered the patient's head with a night-cap, and secured it by a few turns of a roller, the surgeon applies the middle portion of the split bandage to the top of the head, and allows the ends to hang down on each side of the face. Upon this bandage is to be placed, on a level with the cheeks, on each side, a thick compress, which is to be held by the assistant, who supports the head. The body of the double-headed roller is then to be applied to the middle of the forehead, and its ends are to be carried from before backwards, above the ears, to the nape of the neck, where they are crossed. They are then passed forwards again, carried over the compresses and the lip, and so on until the bandage is completely exhausted. The pendent extremities of the split bandage are then to be raised and fastened on the top of the head. The dressing is finished by the application of the four-tailed bandage.

FOUR-TAILED BANDAGE.

The surgeon applies the unsplit middle portion of the bandage to the chin, carries the two upper tails backwards to the nape of the neck, and after having crossed them, he brings them to the forehead, where they are to be secured by a few stitches. The two other ends are then to be carried across the top of the head, and tied or pinned under the chin.

Treatment after the operation.—As soon as the operation is completed, the patient should be put to bed, with his head elevated, and observe the most perfect rest for two or three days. In this manner he will be more easily able to avoid every thing that may excite coughing, sneezing, and laughing, which sometimes occasion the separation of the edges of the wound, or even the removal of a portion of the lip. He should be nourished on broths, or other food that is easy of digestion, and does not require the motions necessary in mastication. Infants should be carefully watched, in order to prevent them from touching the dressings. Roonhuysen, who operated successfully six weeks after birth, was in the habit of depriving them of rest some time before the operation, in order to oblige them to sleep immediately after; and if this could not be effected, he gave them small opiates.

The dressings may be removed on the third day, when the upper needles may be withdrawn without fear of injuring the parts; but the lower one should not be extracted before the morning of the fourth day after the operation. The needles may be readily withdrawn without deranging the ligature, which is generally agglutinated to the wound. The surgeon takes hold at their large extremity, and draws them out by a slight rotatory movement, taking care at the same time to avoid rupturing the cicatrix, by supporting the lip with the thumb and finger of the other hand placed upon the side at which the needle is to come out: an assistant should likewise push the cheeks forwards. The bandage should then be reapplied, and worn until the twelfth day, when it may be laid aside, and the patient begin to take solid food.

When the patient labours under a double hare-lip, the operation must differ, according as the middle lobule is very short and narrow, or according as it is long and wide. In the first case, the surgeon should operate as for a simple hare-lip, and remove the small tubercle; in the second, he should pare away the lateral edges of the lobule, and the corresponding edges of the lip, and unite them with a few needles, which should be carried through the flap so as to come out on the surface of each of the two portions of the lip.

When the middle flap is very broad, it should by no means be removed, even when it does not extend to a level with the free margin of the lip. In this case, the surgeon should pare away its lateral edges, excise its round and vermilion extremity, and unite the wound, which will then have the form of the letter Y, by means of three needles, one for each branch.

In some instances the natural hare-lip is accompanied by a separation of the bones of the palate: under these circumstances, the operation, which we shall presently describe, will generally be sufficient to approximate them. When this approximation, however, takes place slowly, or can not be effected, we are obliged to have recourse to the use of an obturator, consisting of a flat piece of gold or platina, accommo-

dated to the form of the parts, and secured by means of a sponge attached to its convex part. The sponge, which is to be introduced perfectly dry, soon swells, and is frequently sufficient to keep the instrument in its proper place. When the fissure in the palate, however, is very extensive, we are obliged either to employ the obturator of Fauchard, which is supported in the nasal fossæ by means of two moveable pieces or wings, situated at its superior part, and which, being introduced in a vertical position, may be readily brought to their proper place by some particular mechanism of the instrument; or that of Bordet, which is maintained by lateral branches secured to the molar teeth by means of a gold wire.

As to the congenital fissure of the soft palate, it may be remedied by a new operation, analogous to that for hare-lip, which was first performed in France by Professor Roux, who has given it the name of staphyloraphy.

STAPHYLORAPHY.

This operation, which is one of the most delicate in surgery, can not be attempted upon very young subjects, but only upon adults, or grown-up persons, because it requires, on the part of the patient, the greatest care and submission to be able to support patiently the extreme pain with which it is attended, and to submit to the privations which it enforces. In those cases where the velum pendulum palati is alone divided, we may be certain of success, provided the operation is properly performed, and nothing interrupts the process of the cicatrization. When there is the least separation, however, of the bones of the vault of the palate, the operation will generally be attended with imperfect success.

Apparatus.—The apparatus which is required for performing this operation, consists of two or three very delicate curved needles; a porte-aiguille, or kind of forceps for carrying the needles to the velum pendulum palati; a pair of dressing forceps; a pair of scissors, having two short blades, curved upon the sides so as to form a very obtuse angle with the handle of the instrument; and three or four broad silk ligatures.

Operation.—In performing the operation, the patient is to be placed before a clear window, in the same manner as in the operation for hare-lip, his mouth is to be opened as widely as possible, and his jaws are to be kept separated by interposing a piece of linen between the molar teeth. The surgeon then takes one of the needles, armed with its ligature, secures it to the porte-aiguille, and plunges it into the velum pendulum palati, at a short distance below its inferior margin, and about three or four lines from the edge of the fissure, care being taken to embrace the moment when the irritated parts are perfectly at rest. When the point of the needle, which traverses the tissues from behind forwards, has arrived at the anterior

surface of the palate, the porte-aiguille is to be separated, and the needle is to be drawn out with the dressing forceps. After waiting a moment or two, the surgeon takes the other needle, and introduces it into the corresponding portion of the velum pendulum palati, precisely in the same manner as in the preceding case, and conducts the operation as already stated. When the bifurcation is small, a second ligature, placed above the first, will generally be sufficient; but in cases of an opposite character, a greater number will be necessary.

After the ligatures have been thus arranged, the surgeon should push the loops towards the pharynx, in order to prevent them from being cut in paring off the edges of the fissure, and proceed to the second step of the operation. This consists in taking hold of the edges of the congenital cleft with the dressing forceps, and in removing them with a pair of scissors, care being taken to extend the incision beyond the angle of union of the two sides of the velum pendulum palati. The raw surfaces of the wound should then be carefully approximated by tying the ends of the ligature into a simple knot, which should be held by an assistant with the forceps, until the surgeon has made another; for, without this precaution, the ligature will become relaxed, and the edges of the wound more or less separated.

When the operation is completed, the patient should observe the most perfect rest and abstinence for three or four days. He ought not be permitted to speak or laugh, and should avoid every thing that may have a tendency to excite sneezing or coughing. During this time, he should be supported by nourishing injections. About the fourth day, if nothing has interrupted the process of the cicatrization, we should remove the upper ligature; the middle should be detached the next morning; but the lower one should not be touched until the sixth day. They may be cut near the knot with a sharp scissors, and removed with a pair of dressing forceps. During several days, and until the inflammation has completely subsided, the patient should not be allowed to take any thing but fluids.

The operation of staphyloraphy was first performed by Professor Graefe, of Germany, in 1816, and three years afterwards by Roux, of Paris. In this country it was first performed by Dr. Warren, professor of anatomy and surgery in Harvard University, and subsequently by Dr. Stevens, of New York.

Dr. Dieffenbach, of Berlin, having found, upon trial, that there was great difficulty in tying the knots in the ligatures by which the edges of the palate are brought together, has been induced to employ wire of pure lead, instead of the thread used by other operators, and has found it much more convenient, it being merely necessary to twist the ends of the leaden wire. The operation, as performed by Dr. Dieffenbach, consists of three steps; in the first, the surgeon pares away the edges of the fissure; in the second, he applies the ligatures; and in the third, he closes the suture by twisting together the ends of the wires.

CANCER OF THE FACE, AND OF THE LIPS IN PARTICULAR.

The greatest care should always be taken to prevent the development of this serious affection, by avoiding to irritate, in any manner whatever, these tumours or warts, by which they become frequently aggravated, or by destroying them at an early period by a deep and rapid cauterization. Before we have recourse to this means, however, it will generally be more prudent, when the affection appears to be altogether local, to endeavour to combat it by the application of leeches around the part, by fomentations, emollient and narcotic lotions, and by a more or less antiphlogistic method of treatment.

If a cancerous tumour of the lips obstinately resists this treatment, remains stationary, and produces no inconvenience, we ought carefully to watch it, in order to employ speedy measures if it have the least tendency to progress.

A cancerous affection, whether it makes its appearance under the form of an ulcer or a tumour, or whether it occupies the lip or any other part of the face, may be remedied in two ways; either by cauterization or excision.

Cauterization.—When there is a small cancerous ulceration, we should always prefer the use of certain caustic applications to the red iron. The arsenical powder of Frère Côme, or of Rousselot, is generally used for this purpose in France. It is employed by diluting it more or less, according to the extent of the diseased surface, with a small quantity of water or saliva, so as to form a thin paste. If the ulcerated surface is elevated and irregular, the treatment should be commenced by removing all the prominent parts which cover it, by means of the bistoury; but if, on the contrary, its edges are sunk below the level of the skin, we should immediately apply the caustic, which may be done in the following manner. After having wiped the surface of the ulcer, the arsenical paste should be spread upon it so as to form a moderate layer, and extend about half a line beyond the affected parts; after which it should be covered with a piece of thin lawn in order to confine it in its place. When this paste becomes dry, it adheres firmly to the wound, and does not fall off until the eschar separates. The cicatrization of the ulcer gradually progresses in proportion as the crust becomes detached, so that if the separation is long in taking place, the parts will be perfectly cicatrized. If, on the contrary, however, there is an ulceration, it will be sufficient to dress it as a simple ulcer, if it presents a favourable aspect, or to cauterize it again, if it has a bad appearance, and is slow in healing. When the affection is very extensive, the arsenical powder may be advantageously superseded by the nitrate of mercury, which we have seen perfectly successful at the Hôtel-Dieu, in the hands of Professor Récamier.

As regards the excision of diseased lips, we should have recourse to it principally when the ulceration or tumour is of

a considerable size, and does not yield to the employment of emollient or caustic applications, or appears even to augment under their influence.

The operation is performed with the bistoury, and consists in cutting out the diseased part either by means of a semi-lunar incision, as is generally done by Professor Dupuytren, or in making an incision in the form of the letter V. The first method is particularly applicable when the affection extends more in breadth than in height; the second, in cases of an opposite character. In the first case, it will be sufficient, after the operation, to dress the parts like a simple wound, and to wait for the formation of a cicatrix, which will generally be less deformed than might at first sight be supposed; in the second, we should carefully approximate the edges of the wound by means of the twisted suture. In performing either of the operations, we should take care to make the incisions through the healthy parts of the lip, and to remove every part that appears to be diseased.

CHRONIC SWELLING OF THE SUPERIOR LIP.

When this deformity, which is sufficiently common in scrofulous people, continues, notwithstanding the employment of a constitutional course of treatment; when it is old and stationary, and the general symptoms by which it was at first characterized have disappeared; or when it seems to be owing to a state of hypertrophia of the constituent parts of the lip; we should remove it by excising the superfluous portion of the organ, as has been recommended and several times successfully practised by Dr. Paillard.

This gentleman is in the habit of operating in the following manner. "The patient is seated upon a low chair, with his head resting on the breast of the operator, who stands behind him. An assistant takes hold of the commissure of the lips on the right side with the thumb and index finger, and draws it forwards, while the surgeon does the same on the opposite side with the left hand. Then taking a bistoury in his right hand, he makes an incision which shall extend from one commissure to the other, by commencing at the free margin of the lip, at a distance from the anterior surface which must vary according to the thickness of the tissues which it is intended to remove. He then dissects from below upwards to within some lines of the labial frænum; and as soon as the flap is completely separated from the anterior part of the lip, he divides it at its base either with the bistoury, or with a pair of scissors. If the superior coronary arteries are divided, it will be proper to secure them with the ligature.

"By this incision, the surgeon makes a large wound, the healing of which will necessarily be followed by a return of the organ to its ordinary state. In fact, the free margin of the

lip which was previously turned outwards by the swelling, now becomes actually turned inwards, on account of the cicatrization, and is directed downwards parallel to that of the inferior lip, as in the natural state.

“No dressings will be required after the operation is completed. In a few days, however, it will be proper to apply a little pressure to the anterior part of the lip, in order to insure the success of the operation.—The wound should be washed every day with a warm decoction of marsh-mallows.”

CARIES OF THE TEETH.

When this affection is in its incipient stage, and attacks an incisor, a canine, or the first molar tooth, its progress should be arrested as soon as possible by removing the speck with the file; or rather, according to the method of M. Delabarre, by means of a sharp and proper-shaped *burine*. If the tooth is hollow, although it may not give rise to any severe pain, we may have recourse to plugging in order to arrest the progress of the erosion. This operation, which is only practicable in cases where there is no discharge from the tooth, and where the orifice of the cavity which is formed by the caries is smaller than its base, consists in filling the cavity exactly with leaves of gold or platina, by means of an instrument called the *plomber*. If the caries tooth gives rise to frequent and intolerable pain, we should endeavour, if the patient refuses to have it extracted, to allay his sufferings by destroying the nerve of the tooth by cauterization, either with a red hot iron plunged rapidly into the cavity of the tooth, or by the introduction of a piece of the nitrate of silver or of the caustic potash, or a few drops of the nitric or sulphuric acid, with every possible precaution to prevent the caustic from acting upon the other parts of the mouth.

The presence of a caries tooth in the mouth is very frequently the cause of foul breath, which it is impossible to destroy with simple lotions, even when they are of an aromatic nature. Dentists have lately been in the habit of using a compound liquor, which, on account of the well known properties of the chloride of lime, appears to answer the purpose extremely well.

	R. Chloride of dried lime,	℥ij.
	Distilled water,	℥ij.
Filtrate and add		
	Alcohol,	℥ij.
	Essence of roses,	gtt.ij.

A tea-spoonful of this fluid is to be poured into a glass of water, with which the mouth is to be rinsed several times during the course of the day. A small piece of cotton may likewise be dipped into the fluid, and introduced into the cavity of the tooth.

Most of the methods, however, which we have just enumerated, are seldom attended with success, and the extraction of the diseased tooth is the last but most effectual and salutary means to which we can possibly have recourse.

EXTRACTION OF THE TEETH.

The extraction of the incisor and canine teeth is effected by means of a pair of straight forceps, and in the following manner. The patient being seated in an arm-chair, with a raised back, slightly curved backwards, the operator cuts the gums, and seizes the tooth he wishes to extract near its neck with the straight forceps, rotates his hand slightly from right to left in order to loosen the tooth, and withdraws it in a perpendicular direction. The instrument should not be too firmly applied for fear of breaking the crown; and if the tooth be already loose, it may be readily extracted by means of the fingers.

The pullikins, or the curved forceps, may be employed for the same purpose, though they are more frequently used for extracting the first molar teeth. In these cases they may be advantageously superseded by Garengéot's key.

With this instrument we may extract every tooth, though it is more particularly applicable to the extraction of the large molar teeth. In using it, the operator stands in front of the patient, who is to be seated as in the preceding case, and holds it in his right hand like a common key; then applying the extremity of the hook to the internal surface of the neck of the tooth, and the fulcrum, covered with a piece of linen, on the outside of the gum, opposite to the root of the tooth, he fixes the hook with the index finger or thumb of the other hand, according as it is the superior or the inferior jaw upon which he is obliged to operate, and turns the instrument gently in order to ascertain whether it is properly applied. If he perceives that the tooth is firmly secured, he should gradually rotate the key from within outwards, in order to raise the tooth, and then extract it in a perpendicular direction. If the dislocated tooth still adheres to the socket of the jaw, it should be removed either with the fingers or the pullikins. When the crown of the tooth is partly destroyed, and does not afford a sufficient hold on the internal side, the operator should place the hook on the external surface, and apply the fulcrum on the opposite side.—Before the operation is commenced, we should always take care to select a proper hook for removing the tooth: it should be sufficiently large to enable the operator to apply it with facility, and care should be taken that it does not touch the crown, for fear of breaking it. This inconvenience should always be carefully avoided, by using hooks, which, instead of forming a segment of a circle, are bent almost to a right

angle with their middle part, and describe, by their free extremity, a very slight arch.

In order to extract the last molar, or wisdom tooth, the surgeon should always use the lever: in which case, however, the next to the last molar teeth must be present, and be sufficiently solid to serve as a fulcrum. The operator, standing behind the patient, cuts the gums, carries the extremity of the instrument between the two molar teeth, and pushing the one, which he wishes to extract, outwards and backwards, he raises it so as to force it from its socket. Under ordinary circumstances, the operator will afterwards be obliged to remove it with the forceps.—The lever is also extremely useful for extracting the roots or stumps of the teeth; though it is sometimes necessary to employ a pair of straight forceps, with very pointed jaws, which must be applied between the parietes of the socket and the root of the tooth.

When the root is loose, and has thin parietes, we are always in danger of breaking it by the use of the preceding instruments: under these circumstances, we should extract it with a punch, the extremity of which terminates in a kind of sharp conical screw, which must be introduced into the cavity of the tooth by a few turns of the instrument, and then forcibly drawn out so as to bring the root with it.

The bleeding which follows the extraction of a tooth, generally ceases of itself, or by the simple employment of acidulated lotions. When the hemorrhage, however, is profuse and obstinate, we are obliged to check it by plugging the socket with a little lint, agaric, or wax; but if this be insufficient, the base of the socket should be cauterized with the extremity of a probe-pointed red-hot stylet.

RANULA.

When the affection is recent, and the obstacle to the discharge of the saliva through the duct of Wharton, appears to depend upon an inflammation of the orifice of the duct, we ought to have recourse to the employment of emollient colutories, and apply leeches below the chin.

If, in consequence of the absence of inflammatory symptoms, there is reason to believe that the salivary duct is obstructed by a calculus or some viscid matter, the obstruction should be removed by introducing a stylet, and the passage should be prevented from becoming engorged, by dilating it with a leaden wire, which should be frequently withdrawn, in order to evacuate the saliva, and be gradually increased in size. This method, however, is only applicable when the orifice is visible, as in the case related by Louis; a circumstance which so seldom happens, that we are almost always obliged to establish an artificial passage for the saliva, by excising a part of the superior wall of the cyst, and by keeping the opening which is thus made constantly fistulous.

OPERATION FOR RANULA.

The operation for ranula consists in making a semi-lunar incision, with the convexity looking inwards, into the internal part of the tumour, by plunging a straight bistoury into its most distended portion, which is to be carried successively from behind forwards, from without inwards, and from within outwards. The middle part of the semi-circular flap is then to be seized with a pair of dissecting forceps, and cut off at its base by means of a curved scissors. In performing the operation, care should always be taken to proportion the extent of the incision to the volume of the tumour, and that the flap which is to be removed shall consist not only of the mucous membrane, but of the parietes of the tumour itself.

In order to prevent the opening from becoming closed, the surgeon may employ either the method of Sabatier, which consists in introducing linen tents, which are to be worn for some time, and are always to be withdrawn during a meal, and afterwards replaced; or the method of Professor Dupuytren, which consists in keeping open the aperture with a gold, silver, or platina canula, about four lines in length and about two in breadth, and terminated at each extremity by a small elliptical plate, slightly convex on one side and concave on the other. As soon as the opening is sufficiently cicatrized to receive the canula, one of these little plates is to be introduced into the tumour, whilst the other remains in the cavity of the mouth. In this manner, the edges of the opening will remain permanently separated, and the saliva will soon find its way into the mouth by passing between the wound and the canula.

FUNGOUS TUMOURS OF THE GUMS.

Fungous tumours of the gums should be destroyed either by means of the ligature or the scissors, if they are pedunculous, or by means of the bistoury when they are of an opposite character. Surgeons generally advise us to have speedy recourse to the operation, in order to prevent the tumours from acquiring too large a size; but it appears to be more prudent, since they may sometimes be dispersed by resolution, to wait until they impede mastication and pronunciation, or until they present the character of fungus hæmatodes. We have seen a tumour of this kind, which was developed in a young lady in consequence of the loss of the crown of a carious molar tooth, and after it had remained nearly three years, it gradually became smaller and finally entirely disappeared. This tumour was nearly as hard as cartilage, and was of the size of a hazel nut. It presented this remarkable peculiarity, that it was developed during pregnancy, and remained stationary until the next pregnancy, when it rapidly increased in size, and disappeared some time after delivery.

CANCER OF THE TONGUE.

As soon as we have distinctly ascertained the nature of the affection, we should hasten to remove all the diseased parts by means of a surgical operation.

Before we proceed to the operation of excising cancerous tumours of the tongue, it will always be of the utmost importance to distinguish them from such as may arise in consequence of the venereal disease, or from other causes. For, when they are not of a cancerous nature, they will frequently yield to a proper constitutional mode of treatment, and thus save the patient from the great disadvantages that must necessarily result from the loss of a portion of his tongue.

EXTIRPATION OF CANCEROUS TUMOURS OF THE TONGUE.

The patient is to be seated upon a chair in front of a window, with his head turned back, and supported on the breast of an assistant; his jaws are to be separated by means of a thick narrow compress or a piece of linen placed between the molar teeth.

If the tumour be pedunculous, the operator should take hold of it with a double hook, draw it as far forwards as possible, and retain it in this position with the left hand. Then carrying a pair of curved scissors towards the base of the tumour, he cuts it off, taking care at the same time to remove a small portion of the healthy tissue of the tongue. As soon as the tumour is removed, the wound should be cauterized in order to destroy any part that may have escaped the instrument, and to arrest the hemorrhage. If the tongue be greatly disorganized, the diseased part should be removed in different ways according to their extent and the point of the organ which they occupy.

If the tongue be altered in its centre, the affected part should be removed by a transverse section; if, on the contrary, the disease occupies one or both sides, it should be circumscribed with the bistoury or a pair of scissors, taking care to preserve, as much as possible, the form of the organ. In case both sides of the tongue are sound and the middle part is alone cancerous, the diseased part should be taken hold of with a hook, and cut away with a pair of strong scissors by making two incisions, which are to meet at a more or less acute angle, and the edges of which are to be carefully approximated and maintained in contact by means of one or two interrupted sutures.

If the greater part of the tongue be in a state of disorganization, it should be removed with the bistoury or a pair of scissors, by cutting through the adjacent healthy tissues. The application of the ligature, according to the method of M. Mayor, has lately been successfully employed at the hospital de la Pitié, in a case of cancer which occupied two-thirds of the right side of the tongue, from the point to its base. An incision was made from behind forwards, in order to separate the healthy from the diseased part, which was seized and drawn forwards

with Museux's forceps, to facilitate the attempts of the operator, and secured in the loop of a ligature which was carried beyond the diseased parts. The strangulation was afterwards effected by means of a constrictor. The injured portion came away on the sixth day without any unpleasant occurrence.

PROLONGATION OF THE FRÆNUM LINGUÆ.

When the prolongation of the frænum linguæ is so great as to prevent the child from using the breast, or to impede his speech, it may be easily remedied by dividing the frænum.

DIVISION OF THE FRÆNUM LINGUÆ.

The child is to be secured on the lap of an assistant, who holds its nose in order to make it open its mouth. The surgeon standing in front of it, is then to raise the tongue with the thumb and index finger of the left hand, the palm of the hand being turned towards the nose, or rather by gliding beneath it a grooved director, in the hollow of which he brings the frænum, and divides it by a single cut of the scissors.

This operation is generally unattended with hemorrhage; if this accident, however, should occur, and the common astringent lotions are not capable of arresting it, we should cauterize the vessel by applying the extremity of a red hot stylet to its orifice, after having raised the tongue with the two fingers of the left hand, while an assistant depresses the lower jaw.

A common knitting-needle, or any small piece of metal, moderately heated in the flame of a lamp or candle, will generally be sufficient to arrest the hemorrhage, when the stylet is not at hand.

ABSCESSSES OF THE TONSILS.

The opening of these abscesses with cutting instruments, is the most prompt and efficacious means of allaying the pain and other symptoms which accompany them, that can possibly be employed. In order to effect it, the surgeon should separate the jaws and prevent their approximation by placing a piece of linen or cork between the molar teeth, and depress the tongue with the index finger of the left hand. A straight bistoury, covered with a piece of linen to within a few lines of its point, is then to be carried into the mouth, and plunged into the tumour, so as to make a transverse incision. If the jaws are not sufficiently separated to enable the eye to follow the point of the instrument, the operator should introduce the finger and depress the tongue.

CHRONIC SWELLING OF THE TONSILS.

Most of the means that have been recommended for the cure of this disease, are so ineffectual, that we are generally obliged, as soon as it gives rise to an alteration of the voice, to frequent pains in the throat, and especially to a difficulty of deglutition and of respiration, to have recourse to the operation of excision, which is perfectly free from danger and almost always attended with success.

EXCISION OF THE TONSILS.

The instruments which are required for this operation, are a double hook, and a bistoury with a straight or concave edge.

An instrument for removing enlarged tonsils, has lately been contrived by Dr. Physick, professor of Anatomy in the University of Pennsylvania, and is said to answer the purpose extremely well. It consists of two steel plates, the upper of which is secured to the lower by a screw, and is somewhat shorter than the other. Between these two plates is a sharp knife, which terminates at one end in the form of a lance, and at the other in the form of a button, upon which the thumb is pressed when it is intended to push forward the blade. "The blade is made to move steadily by the screw, which connects together the upper and lower plate, and also by a second screw which passes through a groove in the blade and fastens in the lower plate."

In using this instrument, Dr. Physick recommends wrapping a strip of waxed linen round the semi-circumference of the opening at its lower end, to support the mucous membrane until it can be divided by the knife.—*See the American Journal of the Medical Sciences, vol. 1. p. 262.*

The patient is to be placed as in any other operation about the mouth; and if both tonsils are to be removed, we should always commence with the left. The surgeon standing in front of the patient, and holding the hook in the left hand, plunges it deeply into the tonsil, and draws it gently forwards. He is then to carry the bistoury, held like a writing pen, below the gland, which he divides from below upwards, and from behind forwards, on a level with the arches of the velum pendulum palati. This incision should be made rapidly and during one of the intervals which intervene between the nausea, which is occasioned by the presence of the instruments.

In removing the right tonsil, the surgeon is to hold the hook and the bistoury in a different manner: the excision should also be performed with the scissors, which some surgeons altogether prefer.—The gland being seized with the hook and drawn forwards, is to be brought between the two blades of a pair of very strong, blunt-pointed scissors, and divided with a single cut of the instrument.

After the operation is completed, the hemorrhage may be easily arrested with a mixture of water and vinegar, which is to be used as a gargle.

In some instances the voice will remain slightly altered for a considerable time, which has been erroneously attributed to the absence of the amputated tonsil. This inconvenience may be remedied by removing the chronic inflammation of the fauces, by which it is almost always occasioned.

SWELLING OF THE UVULA.

When the swelling is of a chronic nature and does not appear to be connected with an inflammation of the mucous membrane of the pharynx, the excision of the uvula is the only means that is calculated to remedy the inconvenience, and to remove the different symptoms by which it is accompanied. These symptoms, as has been remarked by M. Lisfranc, are to sometimes so severe as simulate some of the organic lesions of the stomach or lungs.

EXCISION OF THE UVULA.

Method of M. Lisfranc.—The patient being placed as in the operation for extirpating cancerous tumours of the tongue, the surgeon takes a pair of long forceps in his left hand, and firmly grasps the uvula, so as to enable him to draw it forwards and a little to the right. This being done, he takes a pair of flat curved probe-pointed scissors into the other hand, carries the instrument almost transversely into the mouth, and by opening its blades, seizes the organ and snaps it off.

The uvula may also be removed with the instrument which has been contrived by Dr. Physick, and which has been described under the head of chronic swelling of the tonsils.

NÆVUS MATERNUS.*

The only species of *nævus maternus* of which it is our intention to speak on the present occasion, is that which partakes of the nature of aneurism by anastomosis, and which was first particularly noticed by the celebrated Mr. John Bell.

When the tumour is small it may sometimes be destroyed by the application of cold washes, and the pressure of a bandage, as recommended by Abernethy and Boyer; by cutting off the supply of blood to the parts by a series of incisions, as suggested by Dr. Gibson; or by extirpating the diseased structure with the knife, as advised by Fabricius Hildanus, Mr. John Bell, and other distinguished writers. Caustic and stimulating applications, formerly so much in vogue for the removal of *nævi*, should always be carefully avoided; and the same may be said with regard to tying the carotid artery, an operation which, I conceive, can not be too much deprecated.

* By the translator.

The best mode of treatment that can perhaps possibly be employed for the cure of this complaint, is the one which was first suggested by Mr. White, of London, in 1827, and which consists in passing a needle, armed with a single or double ligature, through the centre of the base of the tumour, and in tying its ends with sufficient firmness to destroy its organization. In performing the operation an assistant should raise the tumour, with as much of the surrounding skin as possible, so as to enable the surgeon to pass the needle sufficiently deep, and at the same time, include within his knot a portion of the healthy integument. The ligatures should be drawn as tight as possible, not only to cut off the supply of blood, but to mortify the offending part, with the least delay. As the ligatures necessarily create considerable irritation, they should be cut away as soon as they have effected the desirable object—the death of the part—which, if their ends be properly drawn, is generally done in about forty-eight hours.

BUCCAL FISTULA

The best means that can possibly be resorted to for the cure of this deformity and the inconveniences to which it gives rise, is to excise the edges of the opening, and to unite them by means of the twisted suture.

If this operation, however, be impracticable, either on account of the intractableness of the patient, or from any other circumstance, we should close the fistula with an obturator, consisting of a piece of silver, of a length proportioned to the thickness of the cheek, having at one of its extremities a plate larger than the fistulous opening, and at the other a moveable screw arranged so as to fix another plate of the same size. This piece of silver is to be introduced through the internal orifice of the fistula, and as soon as it appears on the outside, the external plate is to be screwed fast.

SALIVARY FISTULÆ.

The salivary fistulæ which result from an injury of the parotid gland, may be cured by touching their internal orifice repeatedly with the nitrate of silver; if this, however, be incapable of effecting a cure, we should endeavour to remove the disorder by making strong pressure upon the part of the gland where the injury is supposed to exist. In order to ascertain whether the fistula be at some distance from the gland, we should introduce Anel's probe, which should be cautiously carried as far as may be desirable along the course of the fistula. The pressure should be made by graduated compresses, which are to be maintained in their proper place by means of a bandage.

Salivary fistulæ of the parotid duct have sometimes been treated successfully in the same manner as the preceding; but in most cases they have resisted this method of treatment, or their cure has been greatly protracted. Numerous methods of treatment have therefore been resorted to; but the most proper and efficacious for all cases where the duct is obliterated, is either that of Louis, which consists in re-establishing the natural course of the saliva by means of a seton passed into the anterior part of the parotid duct; or that of De Guise, which consists in opening a new passage for this fluid, by perforating the mucous membrane of the cheek, and in establishing thereby an artificial salivary duct.

OPERATION FOR FISTULA OF THE PAROTID DUCT.

a.—According to the method of Louis.

The patient being seated upon a chair, with his head turned to the side opposite to the fistula, the operator pulls the cheek slightly forwards, in order to destroy the curve which is formed by the duct of Steno, in its passage over the buccinator muscle, and introduces into its orifice Anel's probe, to which is to be previously secured a ligature. As soon as its blunt-pointed extremity has passed through the fistulous opening, he draws it out, and, when it is entirely disengaged, he separates it from the ligature, the ends of which are to be tied on the cheek.

If it be impracticable to introduce the probe through the natural orifice of the duct, the surgeon should endeavour to pass it through the fistulous opening, which should be carefully enlarged by slightly touching its edges with a little caustic. In order to facilitate the passage of the instrument, he should introduce the index and middle fingers of the left hand into the mouth, if the fistula be on the left side, and vice versâ: these fingers, which are to be placed, the one below, and the other above the duct, so as to push out the cheek, are intended to give the parts a proper direction.

On the morning after the introduction of the ligature, the surgeon should attach a seton, composed of two silk threads, to the extremities which correspond to the fistulous opening, and introduce it into the duct. This seton, which should be daily renewed, is to be gradually augmented in size; and when it has produced a sufficient degree of dilatation, it should be cut off on a level with the external wound. When this is done, the surgeon should content himself by drawing it a few lines in the mouth, in order that, by its remaining in the duct, it may serve as a conductor to the saliva: nor should he remove it entirely until the external opening is perfectly cicatrized. If the edges of the fistula are a very long time in becoming united, they should be made raw by touching them slightly with the nitrate of silver.

b.—According to the method of De Guise, modified by Professor Beclard.

The patient being placed in the manner we have just pointed out, the surgeon extends the cheek with one hand, as in the preceding operation, while, with the other, he plunges the point of a trocar, directed a little obliquely from before backwards, into the fistulous opening. As soon as the instrument has passed through the cheek, he withdraws it, taking care to leave the canula for the purpose of facilitating the introduction of a thin leaden wire. This being done, he carries the trocar into the mouth, and passes it through the cheek from within outwards, and from before backwards, very nearly in the direction of the duct of Steno, and so as to bring its point through the fistulous orifice. The perforator of the trocar being now withdrawn, he introduces the free end of the leaden wire into the canula which remains in the wound, and draws it, like the other, into the mouth. The canula should then be removed, and the two ends of the wire approximated and twisted. The operation is finished by paring away the sides of the external opening by two slightly curved incisions, by uniting their edges, and keeping them in contact by means of the twisted suture.

When the operation is completed, the saliva will readily pass into the mouth through the artificial duct which has been made with the trocar, and the external wound will soon close. All, in fact, that remains to be done, is daily to twist the leaden wire, until it has completely divided the portion of the cheek comprised between its loop.

SCIRRHOUS ENGORGEMENT OF THE PAROTID GLAND.

These kinds of tumours seldom yield to the employment of emollient, discutient, or attenuant applications, or to the different internal remedies that have been proposed for the cure of cancerous affections. Good effects, however, are said to have sometimes been derived from the application of the plaster of diachylon in combination with mercury, or the plaster of gum ammonia softened in vinegar of squills, and the employment of mercurial frictions upon the tumour, carried to such an extent as to produce salivation; and from the internal use of mercurial preparations, and of the extract of cicuta. But in most cases, little reliance can be placed upon these means, and if the tumour is indolent and stationary, or is but slow in its progress, and produces no other inconvenience than some degree of deformity, it should be abandoned to the operations of nature. If its progress, however, be rapid, and its volume such as to compress the jugular veins and give rise to dangerous symptoms; if, in a word, the cancerous disorganization is full of

danger or perfectly distinguishable from other tumours, no time should be lost in extirpating it. This operation, which is generally regarded by practitioners as rash and imprudent, has been several times performed with various results, but with so little success as to authorize us to class it amongst the most dangerous operations in surgery. Surgeons were for a long time in the habit of removing tumours of various sizes from the parotidian region; but it was not until 1823, when Professor Beclard performed his operation, that they had agreed upon the possibility of removing the whole parotid gland. It may not be improper therefore to give an account of the principal circumstances of the operation, notwithstanding its want of success, in order to enable the reader to form some idea how to proceed in similar cases.

After having made two semi-circular incisions around the tumour, Beclard dissected out the portion of the gland which is situated in front of the masseter muscle, and endeavoured to detach it from before backwards, but experienced great difficulty at the internal pterygoid muscle. In order to avoid a hemorrhage, which it would not have been easy to arrest during the operation, he determined to make an incision through the thickest part of the tumour, and by dissecting it from above downwards, he raised the mass, and with it, the inferior half of the cartilage of the meatus auditorius externus, which participated in the disorganization. After having tied a number of arteries, he proceeded to the extirpation of the rest of the tumour. He had nearly finished the dissection, which was performed with the greatest precaution, of the portion of the gland which dips behind the ramus of the lower jaw, when a large jet of blood indicated the division of the external carotid or one of its principal branches. Beclard immediately applied the index finger of the left hand upon the point where the blood issued, and applied two ligatures, the one above, and the other below the point where the carotid appeared to have been opened. The artery was then brought forwards, and slight pressure applied to it until the rest of the tumour was dissected. A small portion of the gland was left near the cervical vertebræ, on account of the narrowness of the wound at that part of the incision, and of the difficulty of entering it. This portion of the tumour was tied with a ligature. The masseter muscle was completely uncovered, and the branches of the seventh pair of nerves were entirely removed with the tumour. The labial artery was denuded, but not divided. At the posterior part of the wound could be seen the mastoid process of the temporal bone and the sterno-cleido-mastoideus muscle; at its internal part, the styloid process, and the external carotid with its two ligatures; lower down were the stylo-hyoid and the digastric muscles; the small portion of the tumour which had been tied, formed the bottom of the wound, which opened into the meatus auditorius externus.—*Extr. from the Arch. Gen. de Méd.*

Let it be repeated, that an operation of this nature should never be performed unless it is imperiously demanded by the danger of the disease, for it may not only be followed by a very extensive erysipelas of the face, and by the ordinary concomitant cerebral symptoms, but by a return of the cancerous affection, especially when the tumour has not been carefully removed, and by paralysis of the muscles of the face, in consequence of the division of the branches of the seventh pair of nerves. The hemorrhage which attends the operation, should always be arrested by tying the carotid artery, as in the case related of Professor Beclard.

In the spring of 1826, Dr. McClellan, professor of Surgery in Jefferson College, successfully extirpated the whole parotid gland, affected with scirrhus enlargement. The patient was an intelligent young surgeon from Europe, and the swelling was so enormous that the whole left side of the face was considerably distorted. On examining the parts, it was found that there was a large and irregular cicatrix over the most prominent surface of the tumour, which proceeded from an ineffectual attempt, previously made by an eminent surgeon of Dublin, to extirpate the diseased gland. As the patient was incessantly harassed with the most excruciating pain, and suffered constantly from a very troublesome chronic inflammation of the left eye, in consequence of an inability to close the eye-lids, Dr. McClellan was at length prevailed upon to make an attempt to extract the tumour, and thus afford the unhappy sufferer the only chance of relief.

The operation was commenced by making two curvilinear incisions, extending from a short distance above the zygoma to within about two inches and a half below the angle of the lower jaw. The integuments were then raised from the surface of the tumour, and an incision was made down upon the zygoma and masseter muscle before, and upon the cartilaginous tube of the ear and mastoid process behind. Being unable to dissect farther in either of these directions, Dr. McClellan immediately proceeded to burrow under the lower extremity of the mass. In endeavouring to accomplish this part of the operation, he was necessarily obliged to divide the posterior belly of the digastric muscle; after which the fingers were at once admitted under the whole body of the tumour, so as to enable him to make effectual attempts to wrench it from its bed. Before he proceeded farther, however, he insulated the continued trunk of the external carotid, just as it was entering the tumour, together with the descending veins, which accompanied it; and, instead of cutting them across, in the usual manner, he tore them out from the body of the tumour with the thumb and fore-finger. The operator's face and eyes were instantaneously deluged with a gush of blood; but before he could recover himself sufficiently to cast a ligature around the vessels, which he still commanded with his fingers, the hemorrhage had completely ceased. After powerful and repeated efforts at wrenching, aided by an occasional use of the knife, to divide the strong bands of cellular substance, and some of the fibres of the styloid muscle, which adhered to the tumour, he finally succeeded in elevating the whole mass above the mastoid process and ramus of the lower jaw. The trunk of the portio dura, very much enlarged in consequence of the previous irritation, was then seen emerging from under the mastoid process, and mounting over the posterior margin of the tumour, to enter its substance near the anterior surface. The unnatural state of tension in which this exquisitely sensible nerve was then placed, produced such an agonizing degree of pain, that the patient was thrown into convulsions and syncope. These, however, speedily disappeared on dividing the nerve; in doing which, the cells of the conjunctiva were instantaneously injected with extravasated blood. The operation was then completed by separating the upper portion of the

tumour from the zygoma, which was effected by the scalpel, inasmuch as the layers of fascia were too strong to be lacerated. In this last step of the operation, Dr. McClellan was necessarily compelled to cut the main trunk of the temporal artery; and this was immediately secured with a ligature, the only one employed during the whole operation.

On examining the cavity of the wound, it appeared much larger at the bottom than on the surface; and its depth was at least four inches and a half from the skin to the walls of the pharynx, which was largely exposed at the bottom of the wound. The styloid process, entirely denuded, and even divested of a large proportion of its muscular fibres, which had been torn away with the tumour, projected into the postero-inferior part of the wound. The internal carotid and jugular vein, together with the hypo-glossal nerve, which were barely covered with some loose cellular tissue, formed the posterior parietes of the deep and expanded part of the cavity that was situated within the ramus of the jaw before, and the mastoid process behind. With a finger, introduced behind the ramus and angle of the jaw, could be felt the two pterygoidei muscles, which were completely exposed, and projected into the cavity in that situation. In fact, the tumour appeared to have projected into, and to have filled up every space into which the parotid itself could possibly have insinuated; and no vestige of any portion of that gland, either sound or morbid, could be discovered in any part of the exposed cavity.

My limits will not allow me to enter into all the details of this interesting case: suffice it to mention that the lips of the wound were brought together with the interrupted suture and a few strips of adhesive plaster; and that the patient, although his sufferings were extremely great, finally completely recovered.—See the *American Medical Review*, vol. iii. p. 387.

To deny that the parotid gland has never been extirpated, would be to impeach the veracity of some of the most skilful anatomists and surgeons that adorn the present age. That the operation is dangerous, and difficult of execution, no one will presume to dispute; but to assert that it can not be performed, is not only absurd, but altogether incompatible with the present state of surgery. Can it be supposed that such men as Beclard and Sir Astley Cooper, whose names are known in every part of the world where medicine is cultivated as a science, would be guilty of publishing cases which never had any existence? Whatever may be the opinion of American and European surgeons upon this subject, I have no hesitation in stating it as my belief, that those who will candidly examine the cases which are on record, will be convinced that the operation is not only practicable, but that it has been actually performed.*

* I have lately visited Mr. Joseph Sorber, the coach-maker at the Falls of Schuylkill, from whose person the right parotid was removed last May, by Dr. McClellan. The tumour was very large, and besides involving the whole gland, extended to the neighbouring parts below and behind. It was chiefly melanotic, being composed of a black medullary substance, intermingled with the granules of the parotid, and involving several of the lymphatic glands of the throat. It adhered to the two upper cervical vertebrae, and was blended with the upper portion of the sterno-mastoideus and trachelo-mastoideus behind, where it had displaced and caused a partial absorption of those muscles. A process of the tumour extended down the neck within the sheath of the great vessels. In dissecting up this last part, it became necessary to take up the common carotid artery, just below its bifurcation. The trunk of the portio dura, with all its larger branches, was removed with the tumour, and can now be seen ramifying through the preparation.

The patient recovered rapidly after the shock of the operation was past, and is now in perfect health, attending to his business and amusements. The only inconvenience which he appears to suffer, is a total paralysis of the muscles of expression on that side of the face and head, both as regards

In order to avoid the necessity of extirpating the tumours that are developed in the substance of the parotid gland, they may be treated as simple erectile tumours, whatever may be their nature, by tying the primitive carotid artery, in order to arrest their development and favour their resolution.

In those cases where the operation of extirpation appears to be altogether impracticable, and where it is absolutely necessary to prevent the increase of the tumour, which, though it may not be of a cancerous nature, exposes the patient to the greatest sufferings and the most imminent danger, we should resort to the application of the ligature en mass, which has lately proved so successful in the hands of Dr. Mayor.—*See the article on Ligature En Mass.*

FRACTURE OF THE LOWER JAW.

When the fracture is simple and without displacement, all that will be required is to keep the two jaws in contact for a sufficient length of time to allow of the formation of callus, which will generally be effected in about forty days.

When there is a fracture, however, whether simple or compound, with displacement, it should be reduced as soon as possible. This may be easily effected, when the fracture is perpendicular to the length of the bone, by pushing the displaced portion from below upwards, until it comes in contact with the other fragments. If the fracture is compound and oblique, and there is a displacement in the direction of the length and thickness of the bone, the posterior fragment should be held back with the index finger of one hand, carried in front of the base of the coronoid process, while the anterior is seized with the index finger of the other hand, placed upon its internal surface, and is brought forwards. When the fracture is seated in the neck of the condyle, and the superior fragment is drawn forwards, it will always be necessary, in order to bring the ends of the fragments into contact, to push the angle of the jaw from behind forwards.

When the reduction is effected, it will be necessary, in order to maintain the fragments in apposition, to approximate the jaws; and, as it is extremely important that they should be every where in even contact, care should be taken to remedy the irregularity of the dental arches, whether it be occasioned by the loss of some of the teeth, or by their inequality, by placing between them on each side of the mouth, a piece of linen moulded so as to render them completely even. This precaution is likewise indispensably necessary in those persons who have lost none of their incisor or canine teeth; because, if this be neglected, we shall necessarily be obliged,

their voluntary and involuntary actions. The sensibility of all the parts is perfect; thus affording a beautiful illustration of Mr. C. Bell's doctrine of the nerves.—S. D. G.

in order to nourish the patient, to introduce the liquid food by means of the stomach tube; while the intervals which separate the pieces of linen, at the anterior part of the mouth, will easily answer this purpose.

“When the fracture is reduced, the surgeon need only adapt some paste-board, wet and softened with vinegar, to the outside of the jaw, both along its side and under its basis. Over this wet paste-board, a bandage with four tails is to be applied, the centre being placed on the patient’s chin, the two posterior tails pinned to the front part of his night-cap, and the two anterior attached to a part of the same cap. more backward. When the paste-board becomes dry, it forms a convenient apparatus for supporting the fracture. A piece of soap-plaster should be applied upon the skin, in order to prevent the inconveniences which might result from the hardness and pressure of the paste-board.”—*S. Cooper.*

The ends of the fragments may also be kept in contact with the following retentive bandage. After having adjusted the patient’s night-cap with a few turns of a roller, the centre of a long compress is to be placed under the chin, and its ends are to be carried to the top of the head and fastened with a few pins. Another compress, of the same length as the preceding, is then to be applied to the centre of the anterior surface of the lower jaw, and tied on the back of the neck. Both these compresses should be moistened with some resolvent fluid, and covered with a four-tailed bandage.

A very convenient bandage for fractures of the lower jaw has lately been proposed by Dr. J. R. Barton, of this city, and has been fully described in the second volume of the American Medical Recorder. It consists of a roller, about four or five yards in length, and one inch and a half or two inches wide. The application is to be commenced immediately below the prominence of the os occipitis, and is to be continued obliquely over the centre of the parietal bone, across the junction of the coronal and sagittal sutures, over the zygomatic process, under the chin. The bandage is then to be passed in the same direction on the opposite side, until it reaches the back of the neck, when it is to be carried obliquely around, and parallel to the base of the lower jaw, over the chin. The same course is then to be pursued on the other side, until the roller reaches the place at which the application was first commenced. This plan is to be repeated until the roller is entirely exhausted, care being taken to secure the different turns of the bandage with pins or stitches, wherever they may appear useful.

In fractures of the condyles of the lower maxilla, the inferior fragment is to be pushed forwards, and kept in its proper place, by applying a thick compress upon the angle of the bone, and confining it with a four-tailed bandage, the posterior ends of which are to be tied on the forehead, in the manner we have already pointed out in one of the preceding pages. This simple bandage will be found to answer the purpose much better than the *capistrum* or *bridle*, which is sometimes used in cases of fractures and dislocations of the lower jaw.

When the fracture is reduced, the patient should avoid talk-

ing, laughing, chewing, and in fact all motion of the jaw. His food should consist chiefly of broths, jellies, &c. and should be taken with a small tea-spoon.

As soon as the dressings become soiled or relaxed, they should be carefully renewed; but, as a general rule, they should be as little disturbed as possible. In most instances, they should be changed about the twelfth day, but after that they should not be touched until the end of the fifth or sixth week, when they may generally be laid aside.

After the consolidation of the fracture, the patient should carefully avoid for some time the chewing of very solid food, for fear of breaking the callus, which is not yet perfectly firm.

DISLOCATION OF THE LOWER JAW.

When both condyles are dislocated, the reduction may generally be effected without much difficulty. For this purpose the patient is to be seated upon a low chair, and his head is to be supported against the breast of an assistant, who is to apply both his hands firmly round the forehead. The surgeon, being in front of the patient, carries his thumbs, covered with a piece of cloth, between the last molar teeth, taking care at the same time to place the fore-fingers under the base of the jaw. The thumbs are now to be firmly pressed against the inferior molar teeth and the base of the coronoid process, so as to disengage the condyles from below the zygomatic arch, and make them glide under the transverse process of the temporal bone, while with the three other fingers the surgeon elevates the chin. A slight degree of noise generally accompanies the sudden approximation of the dental arches, and announces that the reduction has taken place. In some instances when the condyles slip into the glenoid cavities, the teeth are approximated with so much force as to wound the surgeon. In order to avoid this, he should quickly move his thumbs outwards, between the teeth and the cheeks; but this precaution is only necessary in very strong individuals, and those in whom the muscular contractions are extremely powerful.

When the reduction is effected, the jaw should be supported by means of the four-tailed bandage; and, in order to prevent its movements, the patient should be advised to refrain from speaking, and not attempt to masticate for some days. He should therefore be nourished on liquids; and for some time after the bandage has been removed, he should carefully support his chin whenever he has a disposition to gape. These precautions should be strictly observed; because, when the jaw is left unsupported, nothing will be more easy than for a new displacement to take place.

AMPUTATION OF THE LOWER JAW.*

The operation of removing a part of the lower jaw-bone

* By the translator.

was first performed by Dr. Deadrick, of Tennessee; and since by Dupuytren, Lallemand, Lizars, Simons, Bachelder, Wagner, M'Clellan, Mott, Cusack, Randolph, and a number of other surgeons.

In February 1810, Dr. Deadrick had a boy brought to him fourteen years of age, with a tumour occupying a considerable portion of the left side of the lower jaw. The tumour gradually increased in size, and became at length so large as to require the removal of the bone. An incision was commenced under the zygomatic process, and carried over the tumour, in the direction of the bone, to nearly an inch beyond the centre of the chin. A second incision was begun about midway, at right angles with the first, and extending a short distance down the neck. The integuments were then separated from their connexion with the tumour, and the bone was sawed off immediately at the angle and centre of the chin. The wound was united in the usual manner, and the patient had a happy and speedy recovery.—*Amer. Med. Rec.* vol. vi. p. 516—7.

The second operation of the kind was performed by Professor Dupuytren, of Paris, in 1812, upon a patient who suffered from a severe cancerous or osteo-sarcomatous affection of the lower maxilla. Having requested M. Lisfranc to compress each of the labial arteries against the bone, near the lower part of the anterior edge of the masseter, Dupuytren took hold of the right side of the lower lip, with the thumb and fore-finger of his left hand; while Breschet held the opposite side of this lip in the same manner. Dupuytren now made an incision completely through it, from the middle of its red border, and extended the cut as low as the os hyoides. The two flaps were then detached from the swelling; the utmost care being taken, however, not to separate any part from the bone that betrayed the slightest appearance of disease. The labial arteries, imbedded in the muscles, were easily avoided. The two flaps were then reflected outwards, and held by the assistants; while, with the view of more conveniently amputating the bone, Dupuytren detached its inner surface from the soft parts, with which it was connected. This was accomplished by carrying the scalpel along the inner side of its basis, nearly as far as each ramus, where the saw was to be applied. The bone having been fixed, it was sawn through on both sides, one inch from its angles, by means of a small short saw provided with a handle. Hitherto the bleeding had been very trivial. The next measure consisted in dissecting away every particle of the disease about the root of the tongue: the bleeding that now arose was checked by the pressure of the fingers on the branches of the submental and lingual arteries, which were much larger than natural. At length, the trunk of the submental artery was tied, and the rest of the bleeding stopped with the cautery. Suffice it to add, that, in six weeks, the parts had healed up so favourably, that the loss of the jaw-bone to the extent described, could not be

suspected from the appearance of the face. Two small exfoliations occurred, but no disposition to tetanus ever showed itself, notwithstanding the laceration of the inferior dental nerves.

Dupuytren has proposed another method of performing the operation; the first incision has the same extent and direction as that above specified. The external maxillary artery is then to be pushed backward over the edge of the masseter, when a scalpel is to be plunged into the soft parts immediately in front of the vessel, and an incision extended transversely until it joins the first. A third incision is to be made on the opposite side, in a similar manner. Thus, four flaps are produced, which are to be raised as far as their bases. This plan has the advantage of enabling the surgeon to expose more conveniently the whole body of the jaw-bone, and as M. Lisfranc observes, it should be preferred when a large portion of the bone is to be amputated. Dupuytren has demonstrated that, by this method, the lower jaw-bone may be sawn on a level with its rami, without the labial arteries being wounded.

In November 1821, Dr. Mott, professor of surgery in New York, removed a portion of the lower jaw from a young woman, for a disease very similar to the preceding, but occupying a still greater extent, and having adhesions to the soft palate, &c. As, in the proceedings which he contemplated, the principal branches of the external carotid would be wounded, he judged it most prudent to begin with putting a ligature round the carotid trunk, a step which he thought would also tend to lessen the inflammation to be apprehended from the violence which would be unavoidably done to the tongue, palate, and pharynx. The carotid having been taken up, the removal of the jaw was postponed till next morning.

An incision was begun over the condyloid process, opposite the lobe of the ear, carried down over the angle of the jaw in a semicircular direction, then along the lower part of the tumour, which rested upon the thyroid cartilage, and ended on the chin, about half an inch beyond the angle of the mouth. The termination of this incision was just above the attachment of the under lip to the bone, and the mouth was laid open by it. Dr. Mott now extracted the second incisor tooth of that side, as it was in a sound part of the bone, and, after separating the soft parts from the side of the chin, and laying bare the bone, he introduced from within the mouth, through the wound, a narrow saw, about three inches long, resembling a key-hole saw, and thus divided the jaw-bone from above downwards.

The lower part of the tumour was then laid bare, by cutting through the mylo-hyoid muscle, and the flap of the cheek carefully separated and turned up. This fully exposed the whole extent of the tumour, as it rose upwards to the os malæ. After the integuments had been carefully dissected from the parotid gland, the masseter was detached from its insertion, until the edge of that gland was arrived at, when, after sepa-

rating a thin layer of the fibres of the latter muscle, Dr. Mott readily raised the parotid without wounding it. The lower jaw-bone was now laid bare, just below its division into two processes, and it appeared sound. To facilitate the sawing of the bone, it was necessary to make a second incision, about an inch long, close to the lobe of the ear, and terminating at the edge of the mastoid muscle. Then, with a fine saw, smaller and more convex than Hey's, Dr. Mott began to saw through the bone obliquely downwards and backwards, and finished with one less convex. The latter part of the sawing was done with great caution, to avoid the laceration of the inferior maxillary nerve. When the bone had been sawn through, the two processes were observed to be split asunder, and the coronoid to be drawn up by the action of the temporal muscle.

An elevator was now introduced into the division of the bone at the chin, by which means the diseased portion was raised. With a scalpel, passed into the mouth, the tumour was next separated from the side of the tongue, as far back as the posterior fauces, and also from the velum pendulum palati and pterygoid processes. In this manner it was so considerably loosened, that it could be turned upon the side of the neck. It was then separated from the parts below the base of the jaw, and from the pharynx; its detachment was also completed at the posterior angle, the operator carefully avoiding the trunks of the internal carotid, and deep-seated jugular vein, which were both exposed.

The diseased mass, being thus separated above and below, was turned up, the pterygoid muscles detached, and the third branch of the fifth pair of nerves divided, from below, a little above the foramen at which it enters the bone.

In the operation, very little blood was lost. Only two large arteries, viz. the facial and lingual, were divided; but a smaller one, near the angle of the jaw, was tied. The flap of the cheek was brought down, and secured with sutures and adhesive straps. The patient recovered with little deformity.

Dr. Mott's method seems calculated for cases in which the tumour is of very great extent, though only one side of the bone itself is affected. The tying of the carotid was, perhaps, unnecessary.

In 1823, Dr. M'Clellan, of this city, amputated the body of the lower jaw-bone, affected with osteo-sarcoma. The whole of its substance, in front of its angles, was enormously enlarged, projecting downwards in front of the neck, and backwards into the throat, attended with an enormous swelling that extended upwards from the inner surface of the bone, and protruded outwards, so as to look exactly like an enlarged tongue. It rose above the molar teeth, pressed firmly against the roof of the mouth, and quite overlapped the incisors, which were concealed in its substance. Its posterior limits could not be discerned; but, on pressing it down with a spatula, the apex of the tongue could be seen resting upon it behind.

Indeed the tongue was pushed nearly into the pharynx, and hence the great difficulty of respiration and deglutition.

Dr. M'Clellan made an incision through the integuments from the left commissure of the lips, obliquely downwards and backwards, and carried it over the anterior edge of the sterno-mastoid muscle, so as to command the carotid artery in case it should become necessary to secure it on that side. The front edge of this incision was next raised, and the lower part of the tumour exposed. Having ascertained that the carotid need not be touched, Dr. M'Clellan dissected up the integuments forwards, until the whole surface of the tumour was exposed round to the opposite side. Paying no attention to the small arterial twigs, which were divided, he at once secured the facial artery, on each side, just where it emerged from the submaxillary gland. The bleeding from the small branches immediately ceased. He then dissected up the insertions of the masseters, a little way behind the tumour, and exposed the sound bone, which was now divided, on each side, with a metacarpal saw. The whole tumour was next turned outwards from the mouth, and carefully dissected from the under surface of the tongue, the submaxillary glands, and muscles on each side. A part of the sublingual glands, and a considerable portion of the left submaxillary, appearing unsound, were taken away. Only three more arterial twigs required ligatures. Lastly, the flap was laid down in its natural situation, and kept there with sutures and adhesive plaster; the large cavity under the tongue being partly filled with lint, so as to support the loose skin. This operation, which reflects great credit on Dr. M'Clellan, was unfortunately followed by a return of the disease, of which the young patient, a girl six years of age, ultimately died.

About five years since, Dr. Cusack, of Dublin, removed a part of the lower jaw-bone, in a case resembling the disease described by Sir Astley Cooper, under the name of medullary exostosis. The left side of the bone was affected, from the angle to the canine tooth on the right. This tooth having been previously extracted, Dr. Cusack made an incision through the lower lip, beginning at its right commissure, and terminating half an inch below the basis of the jaw. The section of the jaw was next accomplished with a small hand-saw, through the vacant alveolar space. The second incision commenced at the lobe of the left ear, and extended in the course of the outer edge of the ramus as far as the angle. A third connected the first and second, being continued along the base as far as the angle. The flap, thus marked out, was dissected from the surface of the tumour, when the masseter was seen thin and expanded over the swelling. Its fibres were next divided, after which a correct estimate could be made of the extent of the disease. As the ramus appeared sound, its outer margin was sawn, midway between the angle and the condyle. A needle was now

passed closely behind this part of the bone, and a chain-saw drawn by means of it into the same place. With this instrument the sawing was rapidly effected. Dr. Cusack finished the operation by pressing downwards and forwards the tumour, and the loosened portion of the jaw, and dividing the muscles close to their connexions with the bone. A few dossils of lint were placed in the cavity, and the edges of the wound brought together with sutures and sticking-plaster. The bleeding was inconsiderable, no large vessels having been injured.

Dr. Cusack has removed large portions of the lower jaw in no less than four instances, the amputation having been performed in two of them at the joint itself. In doing this, he says, the preliminary steps were, in every respect, similar to those of the operation above described. After dividing the anterior portion of the bone, however, he found the volume of the tumour such an impediment to the further proceedings, that he was obliged to make a second section above the angle. In one example, the ramus was divided, and the processes removed separately. In a second case, they were removed together. The condyle was removed by opening the front of the capsular ligament, forcing the condyle out, and making the requisite incisions for its separation with a blunt-pointed bistoury. Dr. Cusack has recently heard from the first patient, whom he operated upon in June 1824; she enjoys good health, but can not chew solid food. In another case, where the chin was preserved, the patient enjoys full power of mastication.—*Cooper's First Lines*, vol. ii. p. 15.

On the 20th of May, 1829, Dr. J. Randolph, son-in-law of Dr. Physick, excised a portion of the lower jaw, affected with a large osteo-sarcomatous tumour, from the person of a man fifty-three years of age. The disease extended from the first bicuspid tooth on the left side, to within a short distance of the angle of the bone on the right. No trace of the teeth or alveolar processes could be discovered on the right side beyond the second incisor tooth; the bone was here expanded, and exhibited a large, smooth, convex surface, covered by the lining membrane of the mouth. It completely filled up the cavity of the mouth on the right side, and extended nearly as low down as the os hyoïdes. The tongue was thrown out of its natural situation, and rested upon the surface of the tumour, so as to cause considerable difficulty in deglutition. Externally the tumour was pretty uniformly convex, and appeared to be composed principally of osseous tissue; though an evident fluctuation could be felt at the extremity of the chin, and traces could also be perceived denoting several distinct cells or cavities, which were subsequently found to contain a thick, serous, inodorous fluid. The size and weight of the tumour were so great, as to give rise to considerable difficulty in mastication and deglutition, and to a continual tendency to draw the lower jaw downwards, and keep open the mouth.

Having seated his patient upon a high chair, Dr. Randolph made an oblique incision through the lip, commencing at the right angle of the mouth, and terminating about half an inch below the base of the jaw. The right coronary artery, which was necessarily divided by this incision, was then secured with a ligature; and after having raised the superincumbent integuments from the whole external surface of the tumour, the bone was divided with great ease as far back as the first large grinder on the left side, with a common key-hole saw, sharpened for the purpose. The integuments were then dissected from the right side of the jaw, and after securing the facial artery, the bone was sawn through on a level with the last molar tooth. In this step of the operation, Dr. Randolph experienced considerable difficulty, in consequence of the tumour extending so far on this side as to interfere with the motions of the saw. The removal of the diseased mass was now completed, by dividing the mucous membrane of the mouth, and separating the bone from the mylo-hyoïdeus and its other muscular connections.

After the tumour was detached, it was found that the extremity of the bone on the right side, presented an unhealthy appearance, and that it would be necessary to remove another portion. About half an inch more was therefore cut off with a metacarpel saw. About six or eight ounces of blood were lost during the operation. After securing a few small vessels, the integuments were brought together on the right side, and maintained in contact by means of the interrupted suture. A compress was then placed under the chin, and the relaxed integuments were supported by a roller passed round the chin and head.

The operation, which does great credit to the skill of Dr. Randolph, lasted about twenty minutes, and was followed by the most happy consequences.—*See the American Journal of the Medical Sciences*, vol. v. p. 17.

From the foregoing accounts, the surgeon may learn the various ways of effecting the removal of considerable portions, or, if necessary, even of the whole lower jaw-bone. The choice of a method must depend upon the circumstances of the case. The most simple is that adopted by Dupuytren, which seems well adapted for examples, in which only the central portion of the bone is diseased. When the disease extends far towards each ramus, the second plan, suggested by Dupuytren, would be eligible. When the disease is chiefly on one side of the face, but the tumour very large, and it is necessary either to saw the ramus high up, or to take the condyle out of its socket, the other methods, of which a description is given above, are entitled to consideration.—*Cooper, Loc. Cit.*

SECTION II.

Of the Diseases of the Neck.

WOUNDS OF THE NECK.

The treatment of wounds of the neck is precisely the same as that of wounds in other regions, when the integuments alone have been injured, or when the vulnerating body, although it may have penetrated deeply, has wounded no important organ, as is frequently the case in gun-shot wounds. It presents many peculiarities, however, in cases of an opposite character, which will be made known in their proper place.

When there is hemorrhage, and the wounded artery is small and deeply seated, we should attempt to arrest it by making compression by means of graduated compresses, arranged so as to protect the larynx and trachea from the action of the bandage. This compression may often be effected with great advantage, especially on the left side, a little above the sternum. When the artery, however, is large, and the hemorrhage is so profuse as to produce syncope, we should endeavour to apply a ligature around the vessel, and if it be the carotid it should be laid bare by means of a proper incision. If the surgeon is called in immediately after the reception of the wound, and is not prepared to apply the ligature, he should have recourse to compression in the manner we have just indicated, and make such arrangements as shall enable him to tie the vessel as speedily as possible.

After having remedied this accident, which, on account of its importance and danger, should claim the immediate attention of the surgeon, the next thing to be done is to examine carefully the state of the parts.

If there be a transverse wound, attended with injury of the pharynx or œsophagus, the utmost care should be taken to prevent the passage of drinks from traversing the lips of the wound, or from passing into the larynx. For this purpose, a gum-elastic tube should be introduced into the nose, of sufficient length to pass into the œsophagus, and the liquids with which the patient is to be nourished should be injected with a syringe. When the tube is introduced, the lips of the wound should be carefully approximated by bending the head forwards, and keeping it in this position with a flexor bandage.

FLEXOR BANDAGE OF THE HEAD.

After having adjusted the patient's night-cap, by a few turns of a roller and the four-tailed bandage, two long compresses are to be applied to the sides of the forehead, the ends of which

are to be left hanging down the neck, and secured to the head by means of several new turns of the roller. A narrow roller should now be carried round the chest and secured by means of two shoulder-straps. To this roller are to be firmly attached the pendent extremities of the two compresses, which will thus maintain the head in a proper degree of flexion.

When the head has been thus fixed, the wound should be covered with a piece of fine linen, upon which are to be applied a few pledgets of lint and a compress.

If there be an injury of the larynx or trachea, it will be necessary, after having arrested the hemorrhage by the application of the ligature or proper compression, to bring the lips of the wound into contact by means of a proper position of the neck, or, if this be insufficient, by the application of a few sutures or strips of adhesive plaster. If the wound extend into the pharynx, the stomach tube is to be introduced, and the patient is to be nourished on liquids.

Absolute rest, dieting, bleeding, and diluent drinks are especially indicated, and the consecutive local treatment should be the same as in all suppurating wounds.

It sometimes happens, in wounds of the trachea, that the healing process is interrupted so as to give rise to a fistulous opening. Under these circumstances, we should endeavour to remedy the evil and its concomitant inconveniences by means of a sponge, or a ball of lint enclosed in a piece of fine linen, and spread over with simple cerate. This obturator, which may be readily superseded by any other, should be secured by means of a roller or a strip of adhesive plaster.

ANEURISM OF THE CAROTID ARTERIES.

The progress of an aneurism of the primitive or external carotid arteries and their branches, may be arrested by tying the vessel either below or above the tumour. In case, however, the aneurism is seated in the primitive carotid, it will be impossible to apply the ligature below the tumour, on account of the small space* which must necessarily exist between it and the sternum. Before we resort to the operation, the greatest attention should be paid to the diagnosis, in order that we may not mistake an aneurismal tumour of the aorta or of the brachio-cephalic trunk or the subclavian, for an aneurism of the carotid artery, which might be easily done, inasmuch as an aneurismal tumour of the vessels to which we have just alluded, readily may, by being strangulated by the sternum, and by imparting an unnatural pulsatile motion to the orifice of the arteries of the head and neck, produce symptoms similar to an aneurism of the carotid arteries.

It has been satisfactorily demonstrated in the present day

* This space is nearly an inch in extent.

that the primitive carotid artery may be tied without the least danger; but the chances of its success, and the facility of its execution, are so much the greater, in proportion as the tumour is small and remote from the sternum.

LIGATURE OF THE PRIMITIVE CAROTID ARTERY.

The patient is to be placed upon a firm, narrow bed, and his head is to be supported upon a pillow, and held by an assistant. The surgeon being on the affected side, makes an incision through the integuments of the neck, commencing about an inch above the clavicle, below the tumour, and ascending along the inner edge of the sterno-cleido-mastoideus muscle, as far, if the extent of the tumour permit it, as on a level with the superior margin of the thyroid cartilage. This being done, he divides the fibres of the platysma-myoides and the subjacent cellular tissue, which receives the ramifications of the filaments of the superficial cervical plexus, and those which arise from the junction of a branch of the hypo-glossal nerve, and from the internal descending branch of the deep-seated cervical plexus. The inner edge of the sterno-cleido-mastoideus is now to be drawn out and held with a blunt hook. The carotid artery will be found at the bottom of the wound, covered below and intersected by the omo-hyoideus muscle and a part of the loop of the hypo-glossal nerve, and having on its external side the par vagum and the internal jugular vein. The surgeon having clearly ascertained the situation of the artery, is then cautiously to make an incision into its cellular sheath, in order to avoid tying with the vessel the descending branch of the hypo-glossus, and the cardiac nerves by which it is encircled. To accomplish this, he slightly raises the sheath of the vessel with a pair of dissecting forceps, and makes a small incision into it with the point of the scalpel. Into this opening is to be introduced a grooved director, which is to be used as a guide to the bistoury, with which the incision is to be enlarged. The artery being thus insulated, a flexible blunt stylet, armed with a ligature, is to be glided immediately under it; and as soon as the ligature is passed, it should be tied into two simple parallel knots. It sometimes happens, that the internal jugular vein becomes distended, and interrupts the operator: when this is the case, it should be compressed by an assistant at the superior and external part of the wound.

The dressings consist in approximating the edges of the wound with a few strips of adhesive plaster, and in covering them with pledgets of lint and a light compress.

LIGATURE OF THE ARTERIA INNOMINATA.*

The operation of tying the arteria innominata was performed by Dr. Mott, of New York, in 1818, for the relief of a subela-

* By the translator.

vian aneurism; by Professor Graëfe, of Berlin, in 1822, for the same disease; and lately by Mr. Norman, of Bath.

Mott's operation.—Apparatus.—The apparatus required for performing this operation, as recommended by Dr. Mott, consists: 1. Of a small round pointed scalpel. 2. Several blunt-pointed needles of various sizes and curvatures, furnished with an eye at each end, and calculated at one end to screw into a strong handle. 3. Two strong instruments, with handles, having a ring or eye at their extremity similar to a tonsil iron. 4. A small hook, fixed in a very strong handle. These instruments are the invention of Hartshorne, Parrish, and Hewson, of this city, and are the result of experiments, made upon the dead subject, with the view of ascertaining the best mode of tying the subclavian artery on the acromial side of the scaleni muscles.

Previously to commencing the operation, the patient, a sailor, fifty-seven years of age, was placed upon a table upon his back, and his arms were well supported by assistants. An incision, about three inches in length, was then made directly over the swelling, extending along the upper part of the clavicle as far as the trachea, just above the sternum. Another incision of the same length, extended from the termination of the first along the inner margin of the sterno-cleido-mastoïdeus. Dr. Mott then detached the skin from the platysma-myoides, cut through the latter, and cautiously divided the sternal part of the mastoid muscle, in the direction of the first incision. After having detached a portion of the internal jugular vein, which was found adherent to the aneurismal tumour, the operator cut through the sterno-hyoïdeus and sterno-thyroïdeus, and turned them back over the trachea. The carotid was now exposed a little above the sternum, and after he had separated the par vagum and internal jugular vein from it, they were drawn towards the outer side of the neck. The subclavian artery was then laid bare, chiefly with the handle of the scalpel, and as it was found to be considerably enlarged and diseased, Dr. Mott at once determined on taking up the arteria innominata itself. In detaching the cellular tissue from the lower surface of the subclavian artery, a small branch, situated about half an inch from the innominata, was injured; but the hemorrhage was soon suppressed by means of a little pressure.

The division of the arteria innominata being now in view, Dr. Mott continued the operation with a small round-ended sharp scalpel, until the vessel was completely insulated from the adjacent cellular substance. The recurrent and phrenic nerves were then carefully drawn aside, and a needle, armed with a silk ligature, was passed around the artery, about half an inch below its bifurcation.

Dr. Mott's patient died on the twenty-sixth day after the operation; Graëfe's on the sixty-seventh; and both of hemorrhage.—See the *New York Medical and Surgical Register*,

vol. 1. p. 10.—*Graëfe and Walther's Journ. der Chirurgie*, B. 3, p. 596, und B. 4, p. 587.

LIGATURE OF THE SUBCLAVIAN ARTERY ABOVE THE CLAVICLE.*

The patient being seated in a chair, or placed upon a table in a horizontal position, with the shoulder of the diseased side drawn downwards as much as possible, the operator divides the skin immediately above the clavicle, from the external margin of the clavicular portion of the mastoid muscle, to the margin of the clavicular insertion of the trapezius. The edges of this incision being separated, the platysma-myoides will be exposed, and its fibres are to be carefully cut through, so as to avoid wounding the external jugular vein, which will be found immediately under them, near to the middle of the incision. When this vein is discovered, it is to be detached from the surrounding parts, and drawn towards the shoulder with a blunt hook. The operator then divides with his knife, or separates with his finger, the cellular membrane in the middle of the wound until he arrives at the acromial margin of the anterior scalenus muscle. He passes his finger down the margin of this muscle until he reaches the part where it arises from the first rib, and in the angle formed by the origin of the muscle from the rib, he will find the artery. The ligature is now to be passed underneath the artery either with a common aneurism-needle, or that recommended by Desault. When the operator is satisfied by raising the ends of the ligature, compressing the part which it surrounds, and observing that the pulsation in the aneurism ceases, that the artery is the part included in the ligature, the latter is to be tied, and the wound closed with strips of adhesive plaster. When the patient is placed in bed, the neck is to be slightly bent towards the diseased side, so as to retain the edges of the wound in contact.—*See Hodgson on the Diseases of the Arteries and Veins*, p. 378.

ENCYSTED TUMOURS ON THE ANTERIOR PART OF THE NECK.

It has been asserted by authors, that the opening of encysted tumours at the anterior part of the neck, whether it be effected with caustic, or by means of an incision, is invariably followed by an incurable fistula; and as stimulating injections, and the application of caustics to the wound are seldom, if ever, sufficient to excite adhesive inflammation in the neck of the sac, we should always be extremely cautious about opening them. In a case of this kind, after the spontaneous open-

* By the translator.

ing of the tumour, we had for a long time recourse to the use of irritating injections, which were frequently varied, and gradually increased in strength, but they were attended with no benefit whatever; and it was not until all the attenuated and disorganized skin was removed by an incision, that a firm and solid cicatrix could be obtained.

GOITRE, OR BRONCHOCELE.

When the tumour is recent and small, we may have reason to suppose that a cure may be effected by a constitutional method of treatment, consisting chiefly of the use of calcined sponge, or of the different preparations of iodine. And in order to favour the effects of this treatment, the patient should be advised to remove to an elevated situation, especially if the disease has been contracted in a part of the country where the goitre is common; and make use of dry frictions, topical attenuating applications, mineral baths impregnated with sulphur or iron, and an analeptical regimen.

When the tumour, however, is of long standing, it may be regarded as an incurable deformity; for all that can possibly be done, is to retard its increase, or to diminish some of the inconveniences with which it is attended, by removing the different causes which may have produced the disease, by advising the patient to avoid the action of cold and humid air, to abstain from hard labour, as well as from violent exertions of his voice, and to support the tumour constantly with a bandage.

It is only when the goitre has acquired a large size, is of such a nature as to endanger the functions of respiration and of deglutition, to impede the return of the blood from the head to the heart, and to produce other dangerous symptoms, that we are warranted in undertaking an operation for the relief of the patient.

The extirpation of the tumour is altogether too dangerous, on account of the great number of vessels which must necessarily be divided during the operation, and which it would be almost impossible to secure.

The application of the actual or potential cautery is attended with so much inconvenience, and with so little benefit, that it can not possibly be adopted; so that there are, in fact, but three means upon which we can place any reliance. One of these consists in the introduction of a seton, the other in the application of a ligature round the superior thyroid arteries, and the third in the application of the ligature en mass.

The seton, which has often been attended with success, and which is particularly applicable in cases where the bronchocele is formed of a kind of cyst, consists in passing a small skein of silk, or a piece of narrow tape, previously oiled, and introduced into the eye of a seton-needle, from above down-

wards into the tumour, and in keeping up a profuse discharge of matter by the application of stimulating ointment. If the tumour is very large, it may be advisable, in some instances, to introduce a seton into each side. The needle should be plunged to a considerable depth, but never so far as to wound the trunks of the thyroid arteries; a circumstance which occurred in the case related by Dr. Quadri, of Naples, where the hemorrhage fortunately ceased in a spontaneous manner.

The operation of tying the superior thyroid arteries, has been performed by several surgeons with considerable success. It has been almost always attended by a remarkable diminution of the tumour; and should always be preferred to the seton in those cases of bronchocele in which there is reason to apprehend a cancerous degeneration, or a rapid increase of the affected parts.

In performing the operation of tying the superior thyroid arteries, the surgeon should make an incision, which, according to Walter, should commence at the top of the os hyoides, and terminate an inch and a half below, along the inner edge of the sterno-cleido-mastoideus muscle. After having thus divided the common integuments, the artery should be exposed by making an incision through the cervical fascia, care being taken to avoid interfering with the branch of the hypoglossal nerve, which covers it at this place. The vessel is then to be carefully insulated from the numerous filaments of the great sympathetic and the superior laryngeal nerve, and secured in the same manner as in the operation of tying the carotid artery. When the operation is finished, the edges of the wound should be brought into contact, and retained in this position by a strip or two of adhesive plaster.

The necessity of tying both the superior thyroid arteries at the same time, must be determined by the extent and the peculiar dispositions of the tumour.

M. Mayor, a surgeon of Lausanne, has lately published an account of his method of applying the ligature en mass, in the treatment of goitres which require removal on account of the extreme pain which they inflict upon the unhappy sufferer. According to the facts related by this gentleman, his method promises to be extremely useful, and seems to be particularly applicable in those cases where the tumour is very large, lobulated, and composed of a hard compact tissue, and when the bronchocele can not be extirpated with the knife, has resisted the effects of the seton, or is in an incipient state of cancerous disorganization.

LIGATURE EN MASS.

Method of Dr. Mayor.

Apparatus.—The apparatus necessary for performing this operation consists of a kind of tourniquet somewhat similar to

the constrictor contrived by Roderic, and afterwards improved by Sauter; a metallic sheath or canula, intended for the same purpose as the balls attached to Roderic's instrument; and a narrow tape-like ligature, or, what is still better, a silver or platina wire.—When the tumours are small and pedunculous, these instruments are generally sufficient; but when they have a very large base, it is necessary to add a few blunt-pointed needles, proportioned to the extent of the parts through which they are obliged to pass.

Operation.—As the ligature should never be applied upon the integuments, they should be previously divided by means of the bistoury. If the base of the tumour be very large, it should be circumscribed by two semi-elliptical incisions. When, on the contrary, the tumour is round, and adheres but slightly to the subjacent parts, all that will be necessary is to make a single longitudinal incision upon its anterior part. When this is done, in the first case, the operator dissects up the integuments so as to expose completely the base of the tumour, in order to facilitate the introduction of the needles. In the second case, however, he should merely uncover about one third of the mass. If the mass, which the surgeon wishes to remove, is small, he should pass around it, as near as possible to its base, the loop of a ligature, the ends of which are to be previously introduced into the metallic cylinder and fixed to the tourniquet, which should be gently screwed, so as to support the loop of the ligature and prevent it from slipping. This ligature will soon disappear in the substance of the tumour, which should be completely detached, especially if its adhesions are slight, by the constriction of the ligature.

If the tumour be large and adheres very firmly to the subjacent parts, it should be divided into different parts by the application of several ligatures. A needle, armed with a double ligature, should be passed round the most prominent part of its base, and be directed in the most favourable manner for avoiding the large blood-vessels or other important parts. After the needle has passed out completely on the opposite side, it should be removed, and the ends of each of the ligatures should be introduced into the canula. They are then to be directed towards opposite points of the tumour, and attached to two tourniquets. By this arrangement, each of the loops of the ligature will divide the parts which it embraces from the centre to the circumference. If the tumour be so large as to require three ligatures, the surgeon should employ two needles, and introduce them so as to divide the tumour into three equal parts, and then cut the cords as in the preceding case. Each of the ligatures should be adapted to a constrictor; and one of them should be directed upwards, another downwards, and the third and middle one, should be carried around the central portion of the tumour. In case four ligatures are used, it will be necessary to have three needles; in case there are five,

four needles, &c. and as many tourniquets as there are ligatures.

The conduct which is to be observed after the application of the ligatures, must vary according to the circumstances of the case. As soon as the presence of the ligature appears to be no longer necessary, and the parts are completely deprived of life, the compression should be discontinued, and the parts cut off with the bistoury. This will leave a simple wound, which is to be dressed as under ordinary circumstances. When the tumour, however, can not be completely removed by this means, the rest should be destroyed by the application of the nitrate of silver, which Dr. Mayor regards, in this case, as preferable to any other kind of caustic.

TORTICOLLIS, OR WRY-NECK.

The term wry-neck is applied to a continual and involuntary inclination of the head towards one of the shoulders, whatever may be the cause by which it is produced. On the present occasion, however, we shall only speak of that species of the complaint which arises from the paralysis or spasmodic contraction of one of the sterno-cleido-mastoidei, or platysma-myoides muscles.

When there is a paralysis of one of the sterno-cleido-mastoidei muscles, and the cause of the disease has been combated by a proper constitutional method of treatment, and when the affection can not be considered as altogether local, we should endeavour, after having employed galvanism, stimulating liniments, blisters, and even the moxa or the seton, to remove by some other means the disagreeable deformity to which it has given rise. In order to accomplish this purpose, we should restore the action of the paralyzed muscle, either by means of a mechanical bandage or the simple bandage of Winslow, which we shall presently describe, or by cutting across the fibres of the contracted muscle.

ROTATOR BANDAGE OF THE HEAD.

The rotator bandage consists of a single-headed roller or a piece of cloth, about one inch wide, and a yard and a half or two yards in length, and of a few compresses or pads for the purpose of protecting the margins of the axilla from the ill effects of pressure.

Application.—After the bandage has been carried several times round the head, and secured with a few pins or stitches, it should be directed behind the shoulder of the sound side, and passed under the axilla to the anterior part of the chest, where it is to be firmly fixed to the patient's dress or a body-bandage, care being taken to draw it sufficiently tight to restore the head to its natural position.

This bandage, although very simple, fulfils the triple indication of raising the head, of turning the face forwards, and of counteracting effectually the efforts of the unnatural direction of the sterno-cleido-mastoideus muscle. Notwithstanding this, however, its action is sometimes insufficient, and we are therefore obliged to have recourse to the operation of dividing the muscle. This, however, should not be done until we are positively convinced that the disease of the sterno-cleido-mastoideus is idiopathic, of long standing, and the only cause of the lateral inclination of the neck, and that this inclination is neither owing to a rheumatic affection of the cervical muscles, to the contractions of the platysma-myoides, or of the deep seated muscles, nor to an alteration of the cervical vertebræ.

DIVISION OF THE STERNO-CLEIDO-MASTOIDEUS.

The patient is to be seated upon a chair, and his head is to be supported on the breast of an assistant, and inclined oppositely to the affected side. The surgeon being armed with a convex bistoury, makes a transverse incision through the skin and cellular tissue, nearly an inch above the inferior attachments of the sterno-cleido-mastoideus. As soon as this incision, the extremities of which should run across the two edges of the muscle, is made, and the muscle is exposed, the surgeon should carefully divide it through its entire thickness, or rather he should carry behind it a grooved director, which is to serve as a conductor to a straight bistoury with which he is to divide the fibres of the muscle from within outwards.

To prevent the approximation of the lips of the wound, the surgeon should interpose a piece of lint, and keep the head inclined to the opposite side, by means of the bandage which we have just described, not only until the wound is healed, but even for a longer time.

In order to prevent the deformity which must necessarily be occasioned by this operation, Professor Dupuytren has devised the following method,* which should always be put in practice in female patients. The surgeon being armed with a straight bistoury, plunges its point into the skin, at the inner edge of the inferior extremity of the sterno-cleido-mastoideus, a short distance above its attachments; and, as soon as it has arrived on a level with the internal surface of the muscle, he depresses the handle of the instrument, in order to glide its blade flat under the sterno-cleido-mastoideus, until it comes out at the opposite side. The edge of the knife must then be turn-

* This operation was first performed by Professor Dupuytren, in 1823, at the Hotel-Dieu, in Paris, upon a girl of about ten years of age. About thirty-five days after the operation, the movements of the neck were perfectly free in every direction, and the deformity was completely removed, with the exception of a slight lateral inclination of the head.—S. D. G.

ed forwards, and a sufficient quantity of the muscular fibres must be divided, by a sawing motion of the knife, to allow the head to regain its natural position.

After the operation is completed, the divided fibres should be kept separated by depressing the clavicle and inclining the head to the opposite side, by means of several turns of a bandage carried around the head and under the axilla. In order to depress the clavicle, the right hand should be firmly secured to the foot by means of a roller; the leg being flexed nearly in the same manner as in the operation of lithotomy. In a patient who was operated upon according to this method at the Hotel-Dieu, the bandages were kept on for thirty-five days.

If the wry-neck is owing to a permanent contraction of the sterno-cleido-mastoidei muscles, we should resort to the same operation, with the exception that it should be performed upon the affected muscle.

In case the disease is produced by the continual spasmodic contraction, or habitual rigidity of the platysma-myoides muscle, it may likewise be remedied by the division of the fibres of that muscle.

FOREIGN BODIES IN THE LARYNX AND TRACHEA.

Foreign bodies in the larynx and trachea should be extracted as soon as possible, even when the symptoms which are occasioned by their presence, are of such a nature as not immediately to endanger the life of the patient, or when, as very frequently happens, they are severe, but are attended with long intermissions. By deferring the extraction, the patient must inevitably die, either from suffocation, or from the effects of the organic lesion of the aërial passages.

Foreign bodies in the larynx or trachea, can only be extracted by means of a surgical operation, which must necessarily vary according to the nature and size of the body and the place where it is situated. If it is situated above or between the margins of the glottis or in the ventricles of the larynx, all that will be necessary is to make an incision through the anterior part of the thyroid cartilage. The same operation is applicable when the foreign body is situated below the larynx, and is so small and loose as to be moved during the respiratory efforts of the patient. If the body, however, is of considerable size, and appears to occupy the inferior part of the trachea, we should endeavour to extract it by dividing the first cartilaginous rings. When the suffocation, on the contrary, is produced by the presence of a very large substance in the pharynx, or by concretions in the larynx, and it is merely necessary to give passage to the air, it will be sufficient to make an incision through the crico-thyroidean membrane.

OPERATION OF BRONCHOTOMY.

This operation, which consists in opening the larynx or trachea, is called laryngotomy, tracheotomy, or laryngo-tracheotomy, according as the incision is made through the thyroid cartilage, the crico-thyroidean membrane, or the trachea, or as the same incision comprehends the first rings of the trachea and the cricoid cartilage.

Apparatus.—The apparatus required for performing this operation, consists of a straight and probe-pointed bistoury, a grooved director, a pair of strong, curved scissors, a dissecting forceps, a few curved needles, ligatures, a sponge and warm water.

Position of the patient.—In performing the operation of bronchotomy, the patient should always be placed upon his back, and his head, which is to be properly held by an assistant, should be turned backwards so as to render the prominent parts at the anterior parts of the neck more apparent, to enlarge the crico-thyroidean space, and to stretch the membrane which occupies it. The surgeon should stand on the right side of the bed.

Operation.—I. *Laryngotomy.*—The operation of laryngotomy may be performed either by making a simple incision through the crico-thyroidean membrane, or by dividing conjointly this membrane and the thyroid cartilage. This latter method, which has been recommended by Desault, is particularly applicable when the foreign body is lodged in the ventricles of Morgagni; it can be executed with more facility than the other, and the only inconvenience with which it is attended, is, that it can not be performed in old persons whose cartilages are in a state of ossification.

In performing the operation, the surgeon should begin by making an incision through the integuments, exactly upon the prominent line in the centre of the thyroid cartilage, and extending from the superior part of this cartilage to a level with the superior margin of the cricoid. The larynx being exposed and steadied by an assistant, the operator placing the index finger of the left hand upon the middle of the crico-thyroidean membrane, takes care to ascertain the position of the crico-thyroidean artery, and depresses it in order to avoid injuring it with the knife. He now takes the bistoury, like a pen, with the edge turned towards the left side, and carrying the blade flat upon the nail of the same finger, he plunges it immediately under the edge of the thyroid cartilage, a little towards the left of the mesian line. As soon as the want of resistance has apprized him that the instrument has arrived in the larynx, he withdraws it by pressing a little upon the edge, in order to finish the incision, which should be from two to three lines in length. The thyroid cartilage is then to be divided through the whole of its extent, either with the same

bistoury carried upon a grooved director, or with a probe-pointed bistoury, or a pair of curved scissors, as recommended by Baron Percy in the operation of tracheotomy.

The operation of laryngotomy may be performed by another method, for which we are indebted to Vicq-d'Azyr, but which is only useful for the purpose of facilitating the entrance of the air into the lungs, in cases of angina laryngea or an excessive swelling of the tonsils, where there is imminent danger of suffocation. Under these circumstances, however; it should always be preferred, on account of the rapidity with which it can be executed. It differs from the preceding operation only in this, that the incision through the integuments is to be about one inch in extent, and that, after having made an opening into the thyroidean membrane, a small straight or curved canula is to be introduced for the purpose of keeping the edges of the wound in a state of separation. This canula should be made of lead, silver, or caoutchouc, and should not be so long as to interfere with the posterior wall of the larynx, which, in this place, is only from seven to eight lines in diameter in adult individuals. If it be too long, it will be necessary, before it is introduced, to pass it through one or two compresses so as to prevent it from entering too far into the larynx. As soon as it has been properly introduced and covered with a piece of gauze, it should be firmly fixed in its place with two ribands, tied behind the neck. When no instrument of this kind can be obtained, the surgeon may use in its stead, the barrel of a large quill.

In performing the operation of laryngotomy, we have been advised by Dekkers, Louis, Bouchot, Richter, and others, to employ either a trocar or an instrument called the bronchotomus, which consists of a flattened silver canula, having in its interior a sharp projecting blade. This method, however, is at present almost entirely abandoned by surgeons, though it must be confessed it has its advantages, for it is the only means by which it is possible to obviate hemorrhage, and prevent the blood from falling into the trachea. The operation is performed by making an incision through the soft parts, in the manner we have just indicated, and by pushing away the crico-thyroïdean artery with the index finger, upon the nail of which the operator carries the point of the small flattened trocar, described by Mr. Benjamin Bell, and plunges it into the centre of the crico-thyroïdean space. He should then withdraw the blade of the instrument, and introduce the canula, which should be removed as soon as the obstacle to respiration has been destroyed. When the canula becomes obstructed with mucus or coagula of blood, it should be carefully cleaned, and replaced as speedily as possible.

It need scarcely be observed that when the canula gives rise to violent cough, as is frequently the case in angina laryngea, it should be speedily removed, taking care, however, to ascertain first that the accident is not caused by the pressure which

this instrument exerts upon the parietes of the canal; for, if this be the case, all that will be necessary is to rectify its position.

II.—*Tracheotomy*.—The operation of tracheotomy, which consists in dividing from below upwards four or five of the superior rings of the trachea, is at present generally abandoned by surgeons, either because it may be advantageously superseded by the following operation which has been devised by Professor Boyer, or from the fact that it frequently gives rise to dangerous hemorrhage. Indeed, the operator is always obliged to divide the inferior thyroid veins and the middle thyroid artery, when it is present, or to endanger the right carotid or the brachio-cephalic trunk, as well as the left subclavian, if the incision be prolonged too far down, and deviates a little to the right or left, or if, on account of a peculiar anatomical disposition, the first of these vessels runs obliquely across the anterior surface of the trachea, or the second mounts higher up in front of this canal than under ordinary circumstances.

III.—*Laryngo-Tracheotomy*.—The operation of laryngo-tracheotomy is indicated when a foreign body has passed through the larynx, and is lodged in the inferior part of the trachea. It consists in making an incision through the skin, extending from the inferior margin of the thyroid to within about an inch below the cricoid cartilage. The operator should then divide the cellular tissue which connects the sterno-hyoidei and sterno-thyroidei muscles on each side; and, after having thus laid bare the inferior part of the larynx and the commencement of the trachea, he should place the extremity of the left index finger below the second ring of this canal. The blade of the bistoury should next be placed flat upon the nail of the finger, and plunged to the depth of about a line and then withdrawn, in order to finish the operation with the probe-pointed bistoury or the curved scissors; which is to be done by dividing the cricoid cartilage, and the first rings of the trachea from below upwards.

Accidents during the operation.—In whatever manner the respiratory canal be opened, it will always be attended with a more or less profuse hemorrhage, which, unless it be speedily arrested, is sufficient to produce very serious and distressing symptoms. It generally happens, indeed, that there is a profuse discharge of blood from the numerous superficial veins, which can not possibly be avoided, especially if, on opening the trachea, the operator has interfered with a portion of the thyroid gland. This hemorrhage will not only interrupt the operator, but it will produce, even if the smallest quantity of it falls into the trachea, violent and repeated fits of coughing, and even suffocation.

This being the case, it is extremely important that the hemorrhage should be arrested by tying the arteries or veins as soon as they are divided, and the opening of the larynx or

the trachea should be deferred until the bleeding has completely ceased.

If, however, notwithstanding every possible precaution, there supervene a sudden hemorrhage, and the blood, by falling into the respiratory canal, threatens the patient with a speedy suffocation, we should oblige him, according to Virgili, to hang his head over the bed, with his face towards the floor, in order to prevent the farther effusion of blood into the trachea; or rather we should suck out the effused blood with the mouth, as was done successfully by M. Roux, in a female in whom respiration had already ceased. As soon as this indication is fulfilled, the operator should tie the vessels, and if they are not exposed, he should introduce a canula into the wound, which, by permitting the ingress of the air and the discharge of fluids, will speedily arrest the hemorrhage by the pressure which it exerts upon the edges of the wound.

Extraction of the foreign body.—It generally happens that the foreign body escapes as soon as the opening is completed. If this does not occur, however, the operator should endeavour to search for it, by carrying a curved probe carefully towards the ventricles of the larynx or the inferior part of the trachea; and as soon as he has discovered it, he should extract it by means of a pair of curved forceps, if it is not of such a nature as to be discharged by the efforts of respiration, or if it is firmly fixed in the place which it occupies; on the contrary, the operator should abandon it and wait for its expulsion, not only in case he has not been able to find it, but also when it is so light and moveable as to lead us to presume that it will be expelled through the wound by a strong respiratory effort of the patient. Under these circumstances, it will be necessary to keep the edges of the wound separated by means of a canula. It sometimes happens, however, that, even when this precaution is neglected, the foreign body escapes of its own accord.

Treatment after the operation.—When the operation of bronchotomy is completed, it is necessary, amongst other precautions, that, as long as the patient respire through the opening of the larynx or trachea, the air of the apartment should be moderately warm and humid. If it happens that the cause of suffocation is removed immediately after the operation, although the wound will be perfectly useless as regards respiration, we should by no means unite it by union of the first intention, on account of the emphysema which almost invariably takes place when this is done. We should be contented, therefore, with covering the opening with a piece of fine linen, until inflammation has rendered the cellular tissue impenetrable to the air.

DYSPHAGIA FROM STRICTURE OF THE ŒSOPHAGUS.

Whatever may be the cause of the diminution of the diameter of the œsophagus, it is of the utmost importance, when

deglutition is entirely impeded, to introduce into the stomach such food or medicine as may be necessary for the preservation of the patient. This object may be accomplished by an operation called catheterism of the œsophagus.

CATHETERISM OF THE ŒSOPHAGUS.

The operation of catheterism differs according as it is intended to separate the parietes of the œsophagus for the purpose of facilitating the passage of food, or to ascertain the situation of a foreign body in its canal.

A.—In the first case, the operation should be performed by means of the stomach tube, which should be introduced either through the nose or mouth, according to the circumstances of the case. The first method is preferable when there is reason to suppose that the obstacle may be overcome without much difficulty.

The tube being deprived of its stylet, is to be introduced into the nostril, and pushed directly from before backwards by turning it between the fingers. When it has come in contact with the posterior wall of the pharynx, the operator should seize it with the index and middle fingers of the left hand, carried into the fauces, and convey it into the œsophagus. By keeping it in contact with the posterior wall of the pharynx, the operator is in no danger of introducing it into the larynx, which might happen if this precaution were neglected. The instrument should then, if possible, be pushed into the stomach; and, in order to prevent its displacement, its external extremity should be secured by means of a T-bandage and a few stitches.

In introducing the tube through the mouth, the patient should be seated upon a chair, and his head should be turned slightly backwards. The surgeon standing in front of him, depresses the base of the tongue with the index finger of the left hand, and holding the tube like a writing pen, carries it along the radial side of the finger to which we have just alluded, by inclining it slightly towards the left side of the mouth. When the instrument has arrived in the pharynx, he must endeavour to push it on, taking care at the same time to rest it against the posterior wall of the cavity. In this manner it will very readily descend to a greater or less extent into the œsophagus.

If the obstacle can not be removed by this means, it will be necessary to use a tube with a smaller caliber; and if the stricture be extremely obstinate, the operator will be obliged to introduce the instrument with the stylet, or even employ a metallic sound. If this be necessary, he should draw a double ligature through one of the nostrils, as in the operation of plugging the nasal fossæ; and after having given the sound a proper curve, he should carry it into the mouth as far as the ob-

struction, in the manner we have just pointed out. As soon as he has succeeded, by well directed efforts, to re-establish the passage, he should withdraw the slylet, and inject into the stomach either a little broth or any other kind of drink that may be indicated by the state of the patient. When this essential indication is fulfilled, the sound should be properly fixed, so that the operator may be able to keep it in the œsophagus for some time without producing pain. To accomplish this purpose, it should be attached to the extremity of the ligature which hangs through the mouth, and be carried into the œsophagus until its external extremity has passed beyond the *velum pendulum palati*. The tube is then to be brought through the nose by gently pulling at the ligature in the nostril, and secured in the manner we have already pointed out, or by means of a very strong ligature or piece of tape carried round the head.

In order to convey liquids into the stomach, it will be necessary to make use of a funnel or syringe. Before doing this, however, we should carefully ascertain that the tube is in the œsophagus and not in the larynx, a circumstance which may be easily done by passing a finger into the back part of the mouth as far as the pharynx.

In case it is necessary to use a metallic tube, it will be impossible to retain it in the mouth, and as it can not be brought through the nose, it should be replaced by a gum-elastic catheter.

B.—When it is merely necessary to explore the œsophagus in order to ascertain the situation of a foreign body, the surgeon may likewise have recourse to the stomach tube, though more advantage may be derived from the use of Professor Dupuytren's œsophageal catheter, which consists of a firm flexible piece of silver, about eight inches in length, and terminated at one extremity by a ring which serves to hold and direct it, and at the other, by a small bulb or button from one to three lines in diameter.—This instrument is introduced precisely in the same manner as the stomach tube.

FOREIGN BODIES IN THE ŒSOPHAGUS.

Before commencing the extraction of foreign bodies in the œsophagus, the surgeon should always carefully ascertain their nature and situation, and the force with which they are retained, in order that he may be enabled to act upon them in a methodical manner. For this purpose, it will be sufficient to introduce the fingers into the fauces, if they occupy the inferior part of the pharynx or the commencement of the œsophagus, but when they are situated lower down, it will be necessary to have recourse to the operation of catheterism.

If the foreign body can be reached with the fingers, it should be seized with a pair of curved forceps, and extracted. To ac-

comply with this, the operator should close the instrument and carry it along one of his fingers until it has arrived at the foreign body, when it is to be opened so as to take a fair hold of the extraneous substance.

When the foreign body is situated farther down, the operator should endeavour to remove it, either by means of a blunt metallic hook, a pair of œsophagus forceps, a piece of silver, iron, or brass wire, formed into a noose, or with a piece of whale-bone or a gum-elastic catheter furnished with a stylet, and having a piece of sponge, a linen ball, or something similar attached to its lower extremity.

If, notwithstanding the most skilful management, the surgeon is unable to remove it, and if it is of such a nature as not to occasion any serious inconvenience, it should by all means be pushed into the stomach. If the patient is still able to swallow fluids, he should take a very large quantity at a time, in order to force the substance into the stomach; or he may endeavour to force it down by swallowing a bolus of butter, thick pap, or pulpy fruits, and similar substances; if the foreign body, however, completely obstruct the œsophagus, it should be gently pushed into the stomach by means of a probang.

If all these mechanical means have been employed without effect, we should endeavour to excite vomiting, either by titillating the palate, or by making the patient swallow, if possible, a small quantity of oil or an emetic potion, or even by administering an injection of an infusion of tobacco. The same object was successfully accomplished, in a man who suffered very severe symptoms in consequence of swallowing a piece of tendon which stuck fast in the œsophagus, by injecting ten grains of tartar emetic into one of the veins of the arm.

After the foreign body has been extracted, the most urgent indication is to prevent the inflammation which must necessarily result from its presence and from the attempts that have been made to remove it. Bleeding, mucilaginous drinks, and other antiphlogistic means should be immediately employed, if required by the urgency of the symptoms; and in some instances, it will be necessary to have recourse to them even before the operation, especially if the surgeon has been called in after the development of inflammatory symptoms.

If, notwithstanding every cautious attempt to extract the foreign body, it is impossible to bring it out, or to push it into the stomach, we can only expect to relieve the patient by having recourse to the operation of œsophagotomy. The performance of this operation should be decided upon as soon as we have ascertained that the substance is firmly fixed in the œsophagus, and before there are any symptoms of inflammation. But in order to perform it with advantage, it is necessary that the foreign body should occupy the inferior part of the pharynx or the commencement of the œsophagus, and be of such a nature as to endanger the life of the patient. The operation is especially indicated when the substance forms an

apparent projection in the neck. The absence of this projection has been regarded by most authors as a contra-indication of the operation; and, in fact, when this is the case, the chances of success are so slight that it will be better to confide the expulsion of the foreign body to the operations of nature than to the efforts of surgery. The symptoms, however, to which it gives rise, should be carefully remedied, and if there be any signs of suffocation, recourse must be speedily had to the operation of bronchotomy. The patient should be nourished on nutritive injections, or, if it be practicable, by conveying liquids into the stomach by means of a tube.

ŒSOPHAGOTOMY.

Necessary instruments.—A convex bistoury, two blunt hooks, and a pair of curved probe-pointed scissors.

Operation.—The incision should be made, as we have already had occasion to state, in the place where the foreign body projects under the skin of the neck, but if this projection, though it may be more prominent towards the right side, is slightly perceptible on the left, the operator should by all means make the incision upon this side, because there the œsophagus projects some lines beyond the side of the trachea, and is consequently more easily exposed. The incision should likewise be made, as far as possible, between the thyroid gland and the sternum, because, on a level with the inferior part of the larynx, the œsophagus is more deeply situated, and does not deviate to either side, and because the operator will necessarily be obliged to interfere with the thyroid gland and its arteries.

The patient is to be placed upon his back, and his head is to be turned slightly backwards and held by an assistant. The surgeon, being armed with a bistoury, makes an incision through the skin along the inner edge of the sterno-cleido-mastoideus, extending from the middle of the larynx to a level with the fourth ring of the trachea. The integuments and platysma-myoides muscle being thus divided, two assistants should hold away the edges of the wound by means of the blunt hooks. The surgeon taking care to avoid, on the outside, the carotid artery, on the inside the jugular vein, the sterno-hyoideus muscle, the trachea and the recurrent nerve, and below, the inferior thyroid artery, makes a careful incision through the fibro-cellular lamina which next presents itself, and thus exposes the œsophagus, which he divides upon the foreign body to a proper extent. In order to avoid every danger in enlarging this opening, it will be necessary to employ a pair of curved, blunt-pointed scissors.

As soon as the œsophagus is opened, the foreign body should be seized with a pair of straight or polypus forceps, and extracted.

Professor Vacca-Berlinghieri, of Pisa, has proposed a very ingenious mode of operating, which should always be adopted when the situation of the foreign body is unknown, and when the substance is so small as not to form a sensible projection in the neck. It consists in introducing into the œsophagus a gum-elastic canula, having an opening or cleft on one of its sides, about two inches in length. This canula is furnished with a stylet, which is divided at its inferior extremity into two elastic blades, which are each terminated by a semi-olivary bulb, and are held together by a kind of cul-de-sac at the inferior extremity of the canula. The external incision being made in the manner already pointed out, the operator takes the instrument into the left hand and carries it as far as the foreign body, while with the right he pulls gently at the stylet, so as to free the external blade, which thus separates from the other and raises the œsophagus so as to serve as a guide to the bistoury.

Treatment after the operation.—When the foreign body has been extracted, the edges of the wound should be approximated with a few strips of adhesive plaster, and the patient should carefully abstain from swallowing food and drink. The inflammation should be prevented by the ordinary means; and the thirst of the patient should be allayed by sucking sliced oranges or lemons. He should be nourished on nutritive injections; and should not be allowed to swallow any liquids until the sixteenth or eighteenth day after the operation. If it be apprehended, however, that the patient will not be able to support so protracted an abstinence, it will be necessary, after the operation has been completed, to keep a tube in the œsophagus, in order to convey such food into the stomach as he may require.

SECTION III.

Of the Diseases of the Chest.

SCIRRHUS AND CANCER OF THE BREAST.

The surgical treatment of this affection consists chiefly in the removal of the diseased parts, by means of the knife. All the other means, which are resorted to for the cure of the patient, with the exception of compression and the application of the actual or potential cautery, pertain to therapeutics, and form the basis of the constitutional treatment of cancer.

In the operation of cutting away a cancerous breast, the surgeon should never wait until the disease has made so extensive ravages, or has acquired so large a size, that it can not be entirely removed, and until the system presents evident symptoms of a cancerous diathesis. For, under these circumstances, the

operation may be regarded as perfectly useless, and the constitutional treatment, which will then be required, can often be only palliative. However, when the disease is but very slow in its progress, and the constitution suffers no particular disturbance, some time may properly be devoted to the trial of the internal remedies, and external applications, which have obtained a character for their beneficial effects in these unpromising cases. The means from which most benefit can be expected, are emollient and anodyne poultices, the repeated application of leeches around the part affected, a milk diet, laxatives, and diaphoretic medicines. The employment of these remedies, especially in modern times, has often been attended with success even in those cases in which the ulceration had extended so far that the operation itself was no longer practicable.

The operation for the removal of a diseased breast, is executed nearly in the same manner as the removal of cancerous tumours in general, and is indicated whenever the part is affected with an incurable cancer.

In removing a cancerous breast, the surgeon should not rest satisfied with cutting away merely what appears to be in a state of disease; but should always observe the important precaution of taking away a considerable portion of the tissues in which it is imbedded. In cutting out a cancerous breast, it will be necessary also to remove such portions of the integuments as are evidently affected, discoloured, puckered, and closely attached to the diseased lump beneath. This rule is equally applicable when the integuments are healthy, and the swelling is so large that there would be a redundancy of skin after the excision of the tumour; for, otherwise, the loose superfluous portion of integuments would lie in folds, and become so flabby as not to unite favourably by union of the first intention. The direction of the incision must vary in different cases; some surgeons making it straight, simple, or crucial; others, double and oval. In general, however, the shape of the tumour must determine which is the best.

After having made the incision through the integuments, which constitutes the first stage of the operation, the surgeon proceeds to the second, in which he separates the tumour from the surrounding parts; the third and last stage is the division of the parts to which its under surface, or base, is attached. This is done by cutting regularly from above downwards, until every part is divided. The object of the second stage of the operation should be accomplished with a convex bistoury, the blade of which is to be carried through the healthy tissues, so as to include every part of the diseased structure. Yet, whenever the tumour is but slightly adherent to the adjacent parts, it will be better to detach it by the method of enucleation,* which consists in tearing the loose cellular tissue, which connects it to the surrounding parts, with the fingers.

* This term was first proposed by Baron Percy to designate a peculiar

When the tumour is removed and the vessels tied, the surgeon should immediately proceed to the removal of the engorged lymphatic glands.

AMPUTATION OF THE BREAST.

Position of the patient.—The patient is usually placed in a sitting posture, well supported by pillows and an assistant, who is to stand behind her, and steady the chest; but the surgeon will find it equally convenient, if not more so, to place his patient in a recumbent posture, especially when she is feeble, and the operation is likely to be tedious, or there is danger of losing much blood. The arm, corresponding to the affected side, is to be held by the assistant who steadies the chest.

Operation.—In performing the operation, the tumour is to be circumscribed by two semi-elliptical incisions made in the direction of its greatest diameter, and then raising it with a double hook, or the fingers introduced into the last incision, it is to be detached either with the extremity of the fingers, or with a convex bistoury. When the base of the tumour adheres to the subjacent parts, the surgeon should have no hesitation in removing them, even if they should embrace the pectoralis major muscle, or a portion of the ribs, provided they be diseased. The same principles and practice should prevail whenever there is any doubt with regard to the healthy or diseased condition of the parts; for it will be far better to remove a considerable portion of the healthy tissues, than to leave the least atom of morbid mischief, which would be liable to produce a speedy relapse. When the principal vessels are tied, the surgeon should carefully examine every part of the surface of the wound, in order to ascertain that no diseased structure remains behind. The wound should then be sponged, and if any of the smaller vessels still bleed, they should be tied.

Some information may be derived, respecting whether any of the tumour is left behind, by examining its surfaces, when taken out, and observing whether any part of them is cut off; for, if it is, it may always be found in the corresponding part of the wound.

If any of the axillary glands are diseased, it will be absolutely necessary to remove them. For this purpose, it will be proper, after having removed the principal tumour, to adopt the method of Dupuytren, which consists in making an incision along the engorged lymphatic vessels, which are directed towards the axilla, and in pulling out the arteries which sup-

mode of extirpation, which consists in making an incision upon a tumour, and tearing away its connexions with the adjacent parts. The operation is only applicable, however, when the tumour is very moveable and circumscribed, and is imbedded in a mass of loose cellular tissue.— S. D. G.

ply the indurated glands with blood, or in tying these glands at their root, or base, and then cutting them off, just above the ligature. By this last method, we may always prevent hemorrhage, which, in cases of this description, is highly dangerous and troublesome, on account of the difficulty of tying the arteries from which the glands receive their supply of blood.

Dressings.—When the operation is finished, one of the ends of each ligature is to be cut off, and the edges of the wound are to be brought into contact, and covered with a pledget of simple cerate, and a linen compress. These are to be secured with a broad piece of linen, which is to be passed around the chest, and kept from slipping by means of two tapes, one of which is to go from behind forwards, over each shoulder, and be stitched to the upper part of the bandage, both before and behind. It need scarcely be remarked, that the arm of the affected side should be kept perfectly motionless in a sling; for every motion of the limb must evidently call into action the fibres of the great pectoral muscle, and thereby give rise to pain and irritation, and retard the healing of the wound.

Consecutive treatment.—If, instead of union by the first intention, the wound suppurates, it should be dressed precisely like every other wound; and if, as too frequently happens, there be a return of the disease, the tubercles should be carefully removed with the bistoury, and the surface of the wound should be touched with the nitrate of mercury, or the actual cautery, as circumstances may indicate. If, however, there be merely an engorgement, nothing will be necessary but a slight degree of compression.

Professor Récamier has lately revived the method of treatment of external cancers, which was first tried in the year 1809, by Doctor S. Young, of England, where it has since been abandoned as useless, and even dangerous. This method, which has been greatly improved by the Parisian physicians, has already been attended with considerable success, and seems to be exempt from the inconveniences for which it has been reprobated by surgeons.

COMPRESSION OF CANCEROUS TUMOURS OF THE BREAST.

Method of Professor Récamier.

This compression is made by means of a few elastic pieces of agaric, which are to be placed upon each other, and interposed between the turns of a bandage, in such a way as to form a sort of truncated cone, the base of which is to rest against the indurated parts. The turns of the bandage are to be arranged according to the situation, number and size of the engorgements. Thus, for instance, when the breast is small,

and there is merely a hard nucleus, a few circular turns of a common or laced bandage, with a few pieces of agaric, will often be sufficient. When the breasts, however, are large and flabby, it will be necessary to envelope them in such a manner that the engorged part shall alone be compressed. For this purpose, it will be requisite to take a bandage from five to eight yards in length, and to form a kind of figure-of-eight, of which one branch is to force or push up the inferior part of one breast, while the other is to depress the superior part of the opposite breast. The surgeon then applies a large piece of agaric upon each of the organs just alluded to, and confines it by a circular turn of the bandage. This operation is to be repeated until the cone is sufficiently large. When the axillary glands are enlarged, it will be necessary, in order to compress them, to apply the cone in the manner we have just mentioned, and to secure it by means of a bandage passed round the chest and shoulder.

In order to derive every possible benefit from the use of this bandage, more especially when the breasts are very large, it will be necessary to apply two rollers, one of which should be larger than the other.

In applying pressure to only one breast, the surgeon should take a wide bandage, and commence with forming a kind of sling by passing it over the shoulder of the sound side, obliquely across the back and beneath the diseased breast, and from thence over the same shoulder, until the number of turns is sufficient to cover the lower half of the breast. The bandage is then to be carried beneath the axilla, in order to cover the upper part of the tumour. This plan is to be two or three times repeated, and then the bandage is to be carried round the body so as to exert a moderate degree of pressure upon the diseased breast; taking care, in making the oblique and circular turns, to interpose a sufficient number of pieces of agaric.

The manner of applying the bandage must vary, as we have already said, according to the circumstances of the case, but it may be laid down as a general rule, that the compression should always be equable and moderate. Let it be remembered also that the bandage should be daily re-applied, in order that its action may be constantly the same; a circumstance which appears to be of the utmost importance to the result of the beneficial effects of this mode of treatment.

Although this method appears to be more particularly applicable to the indolent engorgements of the breasts and the adjacent lymphatic ganglia, unaccompanied by disorganization of the tissues, the ulcerations of the integuments covering these parts, and the severe lancinating pains do not always contra-indicate its employment; for M. Récamier has seen both disappear under its influence. In case, however, there is a large and deep-seated ulceration, accompanied with pain, a softening of the tumour, and an almost entire disorganization of the mammary gland, extirpation should by all

means be preferred. If it be desirable to try the effects of compression, it will be necessary, before doing so, to change the appearance of the ulcerated surfaces by means of the nitrate of mercury, and even attempt the cicatrization of the sore. It will be advisable, also, when the disease is old and appears to be owing to a peculiar taint of the system, to combat it, according to the method of Professor Récamier, by a diet barely sufficient for the support of life, the use of the extract of cicuta or conium maculatum, and various other remedies. It need scarcely be remarked, that if, during the course of this treatment, there supervene any local complications, such as erysipelas, for instance, it will be necessary to suspend the compression until the symptoms have completely subsided.

EMPHYEMA.

When the presence of serous or purulent matter in the cavity of the pleura is clearly ascertained, and the means which are employed in the treatment of chronic pleurisy are not capable of producing an absorption of the fluid, and there is every reason to suppose that it will not be discharged through the mouth or in the form of an abscess, the surgeon should hasten to make an incision into the chest, in order to let out the matter, and not wait until marasmus has taken place and the patient is threatened with a speedy dissolution. This incision, which is called the operation for empyema, will be so much the more likely to be attended with success in proportion as the patient is young and vigorous, free from organic affection of the lungs, and undisturbed by mental anxiety.

OPERATION FOR EMPYEMA.

Apparatus.—The apparatus which is required for performing this operation, consists of a common and probe-pointed bistoury, a strip of ravelled linen, from five to six inches long, several compresses, lint, and a body-bandage.

Preliminary precautions.—The patient is to be seated upon a chair, or on the edge of the bed, and his legs are to be supported on a stool. The surgeon is then to select a place where the incision is to be made. This place ought to be between the spine and sternum, in the centre of the space between the fourth and fifth false ribs on the right side, and between the third and fourth on the left side. In order to ascertain this place as exactly as possible, the patient should lean towards the side on which the operation is to be performed, while the surgeon carefully counts the ribs from the edge of the costal cartilages downwards. When, in consequence of excessive corpulency, or emphysema, the ribs can not be distinguished, the operation should be performed by making an incision about four inches above the cartilaginous margin

which forms the inferior part of the thorax, for the left side, and about five for the right.

Operation.—The patient being properly supported by pillows and assistants, should be requested to lean to the side oppositely to that on which the operation is to be performed, in order to enlarge the intercostal space, which it is designed to open. The surgeon then holds the skin with the fingers of the left hand, and taking the bistoury in the other, in the second position, makes an incision, about three inches in length, through the integuments and fibres of the latissimus dorsi and obliquus externus muscles, parallel with the direction of the ribs. From this it is obvious, that the incision, when made on the right side, is directed from above downwards and from behind forwards, while, on the left side, it is directed from before backwards and from below upwards. The surgeon then introduces the fore-finger of the left hand into the wound, and places it in such a manner that the nail shall be directed towards the lower edge of the upper rib. Then holding the bistoury as in making an incision from within outwards, he carries its point upon the finger, and plunges it perpendicularly into the chest. When the want of resistance indicates its situation, the wound should be enlarged by pressing against the back of the instrument, taking care, at the same time, to introduce the fore-finger into the chest, in order to prevent the lungs from being wounded. The size of the opening in the pleura should never be larger than is absolutely necessary. It should be made in the same direction as the opening through the integuments, and in making it, great care should be taken to avoid the lower edge of the upper rib, where the intercostal artery lies, and which would otherwise be in danger of being injured.

As soon as the opening is made, the fluid is generally discharged; but, should this not take place, there will be reason to conclude that there is either no collection of matter, or that its escape is prevented by an adhesion of the lungs to the ribs. To ascertain this state of things, it will be sufficient to introduce the fore-finger; and, if it be really found that there is no matter, the wound should be speedily closed by means of a few strips of adhesive plaster, in order to prevent the introduction of the air; or if there be an adhesion, it will be necessary to make a new opening in some other part of the chest.

In the operation for empyema, the English generally make an incision, about two inches in length, through the integuments, which cover the intercostal space between the sixth and seventh true ribs, at the junction of the indigitations of the serratus major anticus, and the externus obliquus muscles. The French have certainly the advantage in cases in which the matter is lodged in the lower part of the chest; and, were I ever called upon to perform the operation, I should be strongly inclined to adopt their plan.

When a certain quantity of fluid has been discharged, the wound should be closed by means of a tent of lint, attached

to a thread, in order to prevent it from falling into the chest, and then covered with a compress and bandage. The patient is now to be put to bed, and requested to lie on the affected side; his head and chest are to be slightly elevated, and his thighs flexed. In about two or three days, another small evacuation should be induced, and this operation should be repeated as often as necessary, at intervals of several days. This precaution, of emptying the chest by degrees, allows the lungs to become gradually dilated, and prevents the introduction of the air into the cavity of the pleura. To avoid this inconvenience, many surgeons prefer performing the operation of paracentesis of the thorax, like that of the abdomen, with a trocar, and to cover the puncture carefully after the operation. This method has a decided advantage over the preceding, especially when the empyema is of long standing, and the fluid is of a purulent nature.

If it be thought proper to discharge the matter in a gradual, but continual manner, the evacuation may be facilitated by introducing into the wound a strip of ravelled linen, or a canula, which should have a broad rim, or a few holes at its upper end, to receive two pieces of tape, in order to enable us to fix it firmly to the chest, and prevent it from falling into the cavity of the pleura.

If the matter escape with considerable difficulty, its evacuation should be promoted by injections of a solution of barley water and honey, or any simple emollient decoction. Irritating injections are generally more injurious than useful; and the same may be said with regard to other injections, however mild, when there is a communication between the cavity of the plura and the bronchiæ.

PENETRATING WOUNDS OF THE THORAX.

What has been already said upon wounds in general, is equally applicable to wounds of the chest; the reader, therefore, is requested to refer to that article, where he will find the fundamental principles of the treatment of penetrating wounds of the thorax.

EXCISION OF THE CLAVICLE.*

This bold and brilliant operation was successfully performed in 1828, by Dr. Mott, of New York, upon a young man for the relief of an osteo-sarcomatous affection of the left clavicle.

The operation was commenced by a semi-circular incision, extending from the sterno-clavicular articulation to the top of

* By the translator.

the shoulder, near the junction of the clavicle with the acromion process of the scapula. The fibres of the pectoralis major were next divided, and ligatures applied to a great number of arteries and veins, which had been unavoidably cut. In this step of the operation, great care was taken to avoid the cephalic vein, which was readily drawn outwards towards the top of the shoulder. The operator then attempted to insinuate the point of the index-finger under the vein and deltoïd muscle to the lower edge of the clavicle, but finding this impossible, from the size of the tumour and its proximity to the coracoïd process, he made another incision, extending from the outer edge of the external jugular vein to the top of the shoulder. After having thus divided the integuments, the platysma myoides; and a portion of the trapezius, and exposed a sound part of the clavicle, at a point nearer the acromion, than a line with the coracoïd process, a curved steel director was cautiously passed under the bone, and retained firmly in contact with its lower surface. The bone was then divided with a chain-saw, conveyed along the groove of the director by means of an eyed probe, constructed for the purpose. The dissection was now continued along the lower surface of the diseased mass, and after tying a number of large arteries and veins, Dr. Mott divided the rhomboïd ligament, and opened the sterno-clavicular articulation from below upwards. By means of a double hook, an elevator, and one or two strong spatulas, the operator was enabled to elevate the sawed extremity of the clavicle, divide the origin of the subclavius, and separate the tumour from the cellular and adipose substance, between the omo-hyoïdeus and the subclavian vessels. The anterior part of the upper incision was then made from the sternal extremity of the clavicle, and extended over the tumour until it met the other at the external jugular vein. After having dissected through the platysma-myoides, this vessel was carefully separated from the surrounding parts, secured with two fine ligatures, and divided. The clavicular portion of the sterno-mastoïd was next divided, about three inches above the clavicle, and cautiously separated, together with the diseased mass, from the deep seated fascia of the neck. "The subclavian vein," says Dr. Mott, "from the coracoïd process to the edge of the scalenus anticus, was so firmly adherent to the tumour, as to lead me at one moment to believe that the coats of the vessel were so intimately involved in the diseased structure, as to render the complete removal of the morbid part impracticable. By the most cautious proceeding, however, alternately with the handle and edge of the scalpel, we finally succeeded in detaching the tumour without the least injury to the vein. This part of the operation was attended with peculiar danger and difficulty. At every cut, either an artery or vein would spring, and obscure the parts, and require to be secured. Besides several large veins, the external jugular was so situated in the midst

of the bony mass, as to require two other ligatures in this situation, close to the subclavian; and it was again divided in the interspace. Near the sternal end of the clavicle, a large artery and vein required ligatures; they were considered branches of the inferior thyroid artery and vein."

The tumour was then detached from over the situation of the thoracic duct, and junction of the internal jugular and subclavian veins; and as its lower part extended upon the thorax, it was necessary to separate the pectoralis major muscle, and make a transverse incision, about two inches in length, through the integuments.

The operation was finished in about four hours, and though the hemorrhage was so free at every incision that about forty ligatures were applied, the quantity of blood lost was not more than sixteen or twenty ounces.

When the operation was completed, the ends of the ligatures were cut off, and the cavity of the wound filled with dry lint. The edges of the incision were then slightly approximated by strips of adhesive plaster, and supported with a compress and bandage.

FRACTURES OF THE RIBS.

The treatment of fractures of the ribs, when unaccompanied by urgent symptoms, is extremely simple, and consists in maintaining their fragments in apposition, and facilitating their union by keeping the parietes of the thorax almost motionless during the act of respiration. For this purpose, a few compresses, wet with a solution of the acetate of lead, or camphorated alcohol, should be placed over the solution of continuity, and a broad roller should be firmly put round the chest, and prevented from slipping downwards by means of a scapulary.

When the fragments are pressed inwards, they should be raised and kept in contact by placing the compresses on the anterior and posterior part of the bone. The bandage should then be applied so as to augment the curvature of the rib, and press its broken part outwards. If, on the contrary, the fragments project outwards, the compresses should be placed directly upon them, for the obvious reason of pushing the parts in an opposite direction. In these cases, however, the bandage will be no longer sufficient; and it will then be necessary to substitute the *quadriga*, which is also applicable to cases of dislocations of the ribs, and to fractures of the sternum.

QUADRIGA.

The quadriga consists of a double-headed roller, about six yards in length, and from four to five inches in width.

Application.—When the compresses have been properly

applied, the surgeon takes the quadriga, places its central portion upon the chest, and carries its two heads beneath the axillæ, as far as the back, where they are to be crossed and then brought over the shoulders, so as to assume the form of the letter X, both before and behind. After the bandage has been thus repeatedly carried beneath the axillæ and over the shoulders, the remainder should be passed round the chest, so as to impede the motion of the ribs, and compel the patient to perform respiration chiefly by the descent and elevation of the diaphragm.

In order to promote the action of the bandage and prevent inflammation, it will be necessary, in case the fracture is simple, to bleed the patient (this precaution in fact should never be neglected), and to prescribe low diet, rest and demulcent drinks; and if the pleura and lungs are disposed to inflammation, it will be of the utmost importance, in order to prevent the development of this dangerous occurrence, to have immediate recourse to the most active antiphlogistic measures.

FRACTURES OF THE STERNUM.

The treatment of fractures of the sternum is precisely similar to that of fractures of the ribs. When there is a mere solution of continuity, surgeons are generally in the habit of applying a piece of soap or diachylon plaster over the situation of the injury, and a roller round the chest. But, in cases attended with great depression, it will be necessary to make free incisions through the integuments, in order to raise the portions of the bone which are drawn in, or to extract any loose splinters which may appear to injure or press upon the thoracic viscera.

The ensiform cartilage, when ossified in old people, is sometimes liable to fracture. In these cases, it is necessary to relax the abdominal muscles, and to cover the part with a piece of soap-plaster, and a roller, in order to keep it steady.

As fractures of the sternum are usually caused by severe violence, it is generally necessary, in addition to the means already recommended, to prescribe bleeding, quietude, a low diet, and the ordinary antiphlogistic treatment.

SECTION IV.

Of the Diseases of the Abdomen.

SUPERFICIAL WOUNDS.

The treatment of superficial wounds of the abdomen, provided they have not been inflicted by penetrating instruments,

is nearly the same as that of wounds in general; but there are a few peculiarities, which merit particular attention.

The most important indications are to lower inflammation, and prevent collections of matter; both of which are extremely liable to take place, on account of the vicinity of the peritoneum and the anatomical disposition of the parietes of the abdomen, which are lined with very strong, tendinous and aponeurotic expansions. When the accumulation of matter, however, is inevitable, it should be speedily discharged, taking care always to remember the peculiar nature of the case; for there is frequently not sufficient alteration in the integuments to denote either the existence, or the extent of the suppuration.

In the treatment of superficial wounds of the abdomen, the patient ought to be kept as much as possible in a favourable position, and the parts should be supported by suitable compresses and bandages. The position of the patient must necessarily vary according to the situation of the wound. When the wound is transverse, and situated on the anterior part of the abdomen, the trunk should be bent forwards, and the thighs put in a semi-flexed position; while, in cases of longitudinal wounds, the trunk is to be kept permanently extended.

In superficial longitudinal wounds of the lateral parts of the abdomen, care should always be taken to bend the trunk to the opposite side; but in transverse ones, it should always be inclined to the same side.

In addition to a favourable position, it will be necessary, more especially in cases of transverse wounds, to apply long strips of adhesive plaster, thick compresses, and a bandage, which is to be carried round the abdomen and prevented from slipping by a scapulary and two pieces of cloth, passed beneath the thighs. As sutures are seldom useful, and often dangerous, they should never be applied, except in cases in which they are indispensably necessary for keeping the edges of the wound in contact.

As the parietes of the abdomen are almost wholly composed of soft parts, and as the viscera are extremely liable to protrude, whenever the resistance of the containing parts is not sufficiently powerful, strict attention should always be paid to the precaution of supporting the wounded part, especially when both the integuments and muscles have been cut: and, in order to guard against hernia, this precaution should by no means be neglected for a considerable time after the wound is healed.

The inflammation which arises in consequence of superficial wounds of the abdomen, is to be checked by local and general bleeding, quietude, low diet, diluent drinks, laxatives, injections, cold applications, or light emollient poultices and fomentations.

PENETRATING WOUNDS OF THE ABDOMEN.

If the wound be simple, that is, if it be confined to the parietes of the abdomen, it is to be treated on the same principle as the superficial wounds of which we have just spoken; and the dangers of peritoneal inflammation must be averted by the rigorous employment of general and local bleeding, and the ordinary antiphlogistic measures.

When the wound, however, is extensive, and the bowels protrude, but are unattended with injury, the first and most important indication is to return them immediately into the abdomen. For this purpose the abdominal muscles should be relaxed by placing the patient in a suitable posture, and the protruded parts should be pushed directly from before backwards, taking care always that those portions which are nearest to the opening be first reduced.

When the protruded viscera are covered with sand, dust, or any other extraneous matter, they should be carefully washed with a sponge and tepid water; and, if there be any difficulty in effecting a reduction, it may often be overcome by an injection, or by gently pressing the contents of the gut into that portion of the intestinal canal, which is within the cavity of the abdomen.

If these precautions, however, be employed to no purpose, all violence is to be carefully avoided, and the wound is to be enlarged. The incision which is made for this purpose, should extend in a direction which will not endanger the epigastric artery, and, if possible, in the same line as the muscular fibres. The operation may be done, either from within outwards, with a straight bistoury and a director, or from without inwards, with a curved blunt-pointed bistoury, much in the same way as in cases of strangulated hernia.—The incision should never be larger than is absolutely requisite, as hernia is much disposed to occur whenever this precaution is neglected.

In all cases, the surgeon should carefully avoid cutting through the peritoneum, as this can be of no benefit whatever. The incision through the integuments should be at least twice as large as that of the muscles, in order that the latter may heal before the other, and thereby prevent the inconveniences which would result from the partial union of the integuments, in consequence of the accumulation of matter.

When there is a protrusion of the omentum, it should be reduced into the cavity of the abdomen in the same manner as a portion of intestine, provided it be sound; but, when this is not the case, it should be left out, until it has sloughed off, which will generally take place without any unpleasant occurrence. In case it is in a gangrenous condition, it should be carefully cut away, and the hemorrhage should be arrested by tying the divided vessels.

Cases sometimes present themselves in which the protruded

bowel is in a state of inflammation. Under these circumstances it should be reduced as speedily as possible, even if it presents a livid colour. The only inconvenience which can possibly arise from such practice, is when the bowel is already mortified.

When the reduction is completed, the surgeon should introduce his finger into the cavity of the abdomen, in order to ascertain that the parts are all in their natural situation, and suffer no constriction between the edges of the wound and the viscera in the abdomen. The patient should then be put in the most favourable position for relaxing the abdominal muscles, and the edges of the wound should be kept in contact by means of a sufficient number of sutures, aided by strips of adhesive plaster, a few compresses, and a bandage.

Cases sometimes present themselves in which the viscera have been wounded, or the injured portion of intestine is so deeply situated that it is impossible to ascertain the form and extent of the wound, or when it is in the neighbourhood of the external opening, or even entirely out. In the first case, all that can be done is to employ such means as have a tendency to prevent and subdue inflammation of the peritoneum and intestines. All attempts at searching for the injured organ will be imprudent and will only have a tendency to give rise to an extravasation of the fecal matters in the cavity of the peritoneum; an occurrence which nature not unfrequently prevents in the first instance by the general and equable pressure which is exerted by the abdominal parietes upon the viscera, and subsequently by the relation which is established between the wound of the intestine and that of the exterior parts, as well as by their reciprocal adhesions.

In the second case, that is, when the wound in the intestine is visible, and is immediately behind the external opening, all that can be properly done is to keep the edges of the latter in a state of separation, in order to facilitate the discharge of the fecal matters, and to prescribe absolute rest, and the usual antiphlogistic means. By this treatment the bowels will soon become firmly united to the adjacent parts, and farther extravasation will be quite impossible. If, on the contrary, the injured bowel protrudes, the edges of the wound should be speedily approximated, and kept in apposition by means of a few sutures.

In cases of partial wounds of the intestines, we may be contented, according to the advice of Mr. S. Cooper, with making one or two sutures, with a common sewing-needle, armed with a very thin silk ligature, taking care at the same time to follow the counsel of Mr. Benjamin Bell, Thomson, Travers, and others, to cut off the ends of the ligature close to the knot and to return the bowel into the abdomen. The mere contact of the edges of the wound is sufficient to facilitate the adhesion and prevent effusion. The ligatures gradually make their way

into the intestinal canal and are finally discharged with the stools, without any inconvenience.

When the bowel is divided through its whole cylinder, or nearly so, the conduct of the surgeon must be quite different. The two ends of the intestine are to be brought through the wound,* and, after being emptied of their contents, they are to be approximated and kept in contact, either according to the method of Chopart and Desault, or according to that which has recently been proposed by M. Jobert. This last method consists chiefly in bringing into contact the two serous portions of the bowel, with the view of effecting a firm and speedy adhesion, instead of putting in contact, as was formerly done, a mucous with a serous membrane, that is to say, two parts which can not contract permanent adhesions with each other.

SUTURE OF THE INTESTINES.

a.—According to the method of Chopart and Desault.

Previously to commencing the operation, the surgeon should make a tube of thin paste-board, rather smaller than the diameter of the intestine, and soak it in oil of turpentine, in order to prevent it from becoming too speedily macerated. He then takes a silk ligature, about twelve inches in length, and arms it with two fine needles, one of which is to be passed through the centre of the tube, and carried in a transverse direction, so as to come out at the distance of about three lines from the point at which it entered. After this manœuvre has been repeated, the ligature will be found attached to the tube, without crossing its cavity, and without presenting the least obstacle to the course of the fecal matters. The two needles are next to be carried through the upper part of the bowel, equi-distant from each other, and at a distance from its orifice equal to the half of the length of the tube. The tube is now to be introduced into the upper portion of the intestine, while an assistant draws the extremities of the thread in a transverse direction: the surgeon then pierces the lower portion of the bowel in the same manner as the upper, but a little farther from its orifice, and introduces the remainder of the tube. Should this invagination be rendered impracticable on account of the mesentery, an incision should be made through it, to an extent proportioned to the part of the bowel which is to be introduced into the other and, after having allowed the vessels to become disgorged, and tied those which appear to be a source of hemorrhage, the operation is to be finished in the manner we have already stated. When the ligatures have been drawn with sufficient

* The upper end of the intestine, or that corresponding to the stomach may be readily distinguished, by administering one or two ounces of the oil of almonds, coloured with a solution of the root of the anchusa tinctoria.

firmness, the parts are to be returned into the cavity of the abdomen, and, in order to promote their adhesion, they are to be brought exactly opposite, and contiguous to the outer wound, by means of one or two ligatures, which are to be tied on the outside, and secured with a strip of adhesive plaster.

b.—According to the method of M. Jobert.

Having made an incision through the mesentery, in the manner just mentioned, and being provided with a waxed ligature from six to eight inches long, armed with two fine needles, “the surgeon,” says M. Jobert, “takes the upper part of the bowel in his left hand, while, with the other, he passes one of the needles from within outwards through the anterior wall of the intestine at the distance of three lines from its orifice, so as to form a loop, the convexity of which is directed upwards, and the concavity downwards: this loop is to be given to an assistant. After the same operation has been performed in the corresponding point of the posterior wall, the surgeon takes a pair of dissecting forceps, and inverts the inferior part of the bowel, in such a manner as to form a serous surface. This step of the operation is to be executed at the moment when the intestine is perfectly free from peristaltic motion. Having made this inversion, the surgeon keeps the parts in their place by the introduction of the fore-finger of the left hand, and taking the two needles which are attached to the anterior ligature, he passes them over the radial edge of the fore-finger that is introduced into the lower part of the bowel, the anterior double wall of which is to be traversed from within outwards, so as to allow the needles to come out at the distance of about one line from each other. These needles are then to be again given to an assistant, while the surgeon takes those which are attached to the posterior ligature, and passes them over the ulnar edge of the fore-finger, across the posterior wall of the intestine, precisely in the same manner as the preceding. When the ends of the bowel are nearly in contact, the surgeon withdraws the finger, and taking hold of the extremities of each ligature, he gradually introduces the upper into the lower part of the intestine. This introduction may be facilitated by pressing upon the upper portion of the bowel with some round and polished body.

“This method has been modified by M. J. Cloquet, who, instead of inverting the lower, and introducing the upper end, recommends passing the needle through the parietes of the intestine, at a few lines from the place of the injury, and to draw the two ends against each other, so as to bring the serous surfaces carefully into contact. The ends of the bowel are thus to be maintained in apposition, by means of several sutures, and the extremities of the ligature are to be cut off near to the intestine.”

Dressings.—As soon as the operation is finished, and the parts have been reduced, the lips of the outer wound are to be brought into contact by strips of adhesive plaster, or by means of the quilled suture, and the parts are to be covered with a pledget of simple cerate, a few compresses, and a bandage.

The patient is to be placed in the most favourable position for relaxing the abdominal muscles, observe the most perfect rest, make use of a strictly low diet, and drink plentifully of diluent drinks. He should be bled immediately after the operation is completed; and, if there arise any inflammatory symptoms, they should be speedily subdued by repeated local and general bleeding, by emollient fomentations, and the ordinary antiphlogistic means.

If no unpleasant occurrence take place, it will be proper to take off the dressings in about four or five days, and to remove the external sutures; but the ligature in the intestine should never be cut away before the seventh or eighth day; a precaution which should always be remembered by the surgeon.

If the protruded bowel be affected with gangrene, it should by no means be returned into the abdomen, as it would soon give rise to fatal extravasation.—*See the article on Strangulated Hernia.*

The treatment which we have now pointed out, is only applicable to wounds of the intestinal canal: with respect to those of the other viscera which are contained in the abdomen or pelvis, all that can possibly be done is to prevent and subdue the severe and often fatal inflammation, with which they are usually accompanied. In cases of wounds of the bladder, however, there is always a peculiar indication—that of facilitating the discharge of the urine, and thus preventing its effusion into the cavity of the pelvis. This indication is to be fulfilled by the introduction of the catheter, which is to be kept in the bladder until the parts have become perfectly cicatrized.

Wounds of the stomach.—In cases of wounds of the stomach, which happen immediately after taking a hearty meal, it has been recommended, though improperly, to induce vomiting with the view of emptying the organ, and thereby preventing the effusion of its contents into the cavity of the peritoneum. This advice is highly injudicious, and should never be adopted, except when the stomach is much distended in cases of wounds of the small intestines. By this means, the food may be prevented from passing into the injured portion of intestine, and the irritation which it would otherwise cause, will of course be avoided. In these cases it is far better to excite vomiting by titillating the palate, than by administering ipecacuanha, or tartarized antimony.

Extravasation into the cavity of the abdomen.—Extravasation into the cavity of the abdomen, is always to be considered extremely dangerous, especially if the fluid consists

of urine, bile, or feces. All that can be done in cases of this description, is to employ the most active measures, in order to subdue the inflammation of the peritoneum, and to prevent it from terminating in gangrene. Surgeons, however, have recommended, not with a view, it is true, of saving the life of the patient, but rather of prolonging his existence, to give vent to the extravasated fluid, by making an incision through the abdominal parietes.

This operation is always more successful when there is merely an extravasation of blood: in this case it should be performed as speedily as possible, care being always taken to ascertain previously that the divided vessel has ceased bleeding. The incision should be made through the most prominent part of the abdominal parietes, which is generally in the hypogastric region. In order to avoid hemorrhage, and the formation of a hernia, it should be made parallel with the rectus muscle, about six lines from its outer edge, above the level of the antero-superior spinous process of the os ilium, and from above downwards to within an inch of the inguinal ring. The bistoury is to be thus carried successively through the integuments, the muscles and peritoneum. The opening through this membrane should be no larger than is absolutely requisite. When the matter has been discharged, the incision should be kept open by a tent of lint, in order to facilitate the escape of the fluid that may have been left in the abdomen, and the parts are to be dressed precisely like a suppurating wound.

DROPSY OF THE ABDOMEN.

When this affection is seated in the cavity of the peritoneum, it is termed ascites, and ovarian dropsy when it attacks the investments of the ovaria. The surgical treatment of these diseases, which is very frequently only palliative, and should always be accompanied or preceded by the employment of proper constitutional remedies, consists in giving vent to the extravasated fluid, by an opening through the parietes of the abdomen.

When this operation, which is usually termed paracentesis, constitutes a part of the radical treatment of dropsy, it should be performed as soon as the collection of the serous fluid is so great as to leave no doubt with regard to the nature of the affection, and when the parietes of the abdomen are so much distended as to preclude all possibility of wounding any of the viscera. Desault used to tap dropsical patients once a week, and, in many cases, after he had performed the operation two or three times, the disease perfectly disappeared. In advanced cases of dropsy, on the contrary, which are owing to a considerable derangement of the abdominal viscera, and when the patient is old, and has been several times tapped

without success, the operation can only be regarded as palliative, and should never be performed until the distention is so great as to impede respiration, and cause considerable pain; because experience has fully proved, that repeated tapping is highly injurious. Let it also be remembered, that the operation is never to be performed when the patient is harassed with hectic fever, marasmus, and extreme sufferings; for this would only tend to expedite his passage to the grave.

PARACENTESIS ABDOMINIS.

Apparatus.—The apparatus which is required for this operation, consists of a common trocar, a vessel for receiving the fluid, a piece of diachylon plaster, a few compresses, a bandage, and towels. There should also be two or three assistants.

Operation.—Before commencing the operation, the surgeon should always determine upon the best place for making the puncture. It matters little, in general, on which side of the linea alba it is made; but surgeons usually prefer the right, because the small intestines do not float in so great a quantity, and the omentum does not descend so far down in this as in the left side. According to the celebrated Boyer, the instrument should be plunged in the centre of a line, drawn from the navel to the antero-superior spinous process of the ilium, or, as has been more carefully indicated by Professor Lisfranc, in the centre of a straight line drawn also from the navel to the antero-superior spinous process of the ilium, but commencing at about two-thirds of an inch below the middle of a vertical line, extending from the inferior extremity of the ensiform cartilage, to the symphysis pubis. Sabatier used to operate in the centre of the space which is comprised, on the one hand, between the edge of the false ribs and the crest of the ilium, and on the other, between the navel and the spinous processes of the vertebræ. Let it always be remembered, in performing this operation, that the epigastric artery runs closely along the outer edge of the rectus muscle, and that there is less danger of wounding it, in proportion as the puncture is made farther from the navel; and also that it recedes considerably from the linea alba in cases in which the abdominal parietes are greatly distended.

Having determined upon the place where the puncture is to be made, the patient is to be placed upon the edge of the bed, his head and chest are to be gently elevated, and his thighs flexed. An assistant is then to be placed on each side, in order to make gentle and uniform pressure upon the anterior and lateral parts of the abdomen. When every thing is ready, the surgeon takes the trocar, the point of which is to be previously oiled, in his right hand, and introduces it in a firm and steady manner, until the want of resistance indicates that the

instrument has entered the cavity of the abdomen. He now takes hold of the canula with the thumb and index finger of his left hand, and gently insinuates it further into the cavity of the peritoneum, while, with his right hand, he withdraws the stilette. The fluid now gushes out, and in proportion as it escapes, the abdomen should be gently compressed by the assistants; for this is the only means of preventing the swooning and convulsions which always accompany the too sudden evacuation of a large collection of dropsical fluid. In order to facilitate the flow of the water, and to evacuate the abdomen completely, the surgeon should turn the canula in various directions, and raise the pelvis by means of pillows. The assistants are also at the same time to increase the pressure on the abdomen.

When the water has been evacuated, and the canula withdrawn, the edges of the wound are to be brought into contact by a strip of adhesive plaster, and the abdomen is to be supported by a piece of flannel and a roller.

In England and this country, surgeons are almost universally in the habit of performing the operation of paracentesis abdominis through the linea alba, about midway between the umbilicus and pubes. In this place the puncture may always be made with the utmost facility and safety, notwithstanding the apprehensions which are entertained by some eminent French surgeons of wounding the great arterial trunks, and the anterior wall of the bladder.

The puncture may be made either with a common bistoury, or a trocar, as recommended by M. Tavernier; but, instead of using the common canula, the surgeon will be able to evacuate the fluid with much more facility by introducing a female catheter, or a silver tube, closed at its inferior extremity, and having a great number of lateral perforations. By this means, it is obvious, that no obstruction can arise from the intestines or omentum, and that, unless the fluid is very viscid, it possesses a decided advantage over the instrument generally employed.

In performing the operation, the patient may be placed either in an arm-chair, or on his side, sufficiently near the edge of the bed; and this posture has a decided advantage, inasmuch as it has a tendency to prevent the alarming syncope which almost invariably takes place when the patient is in the erect posture, in consequence of the sudden removal of the pressure of the fluid upon the diaphragm and abdominal viscera. When the operation is necessary to be repeated, the surgeon should always bear in mind not to introduce the trocar through one of the former punctures; as, by neglecting this precaution, there will be great danger of wounding some of the intestines, which are apt to become agglutinated to the adjacent parts.

Accidents.—It not unfrequently happens that the water suddenly stops, long before it is completely discharged. This may sometimes be owing to a piece of intestine, or omentum, or some other foreign body, obstructing the canula. This kind of stoppage may be removed by introducing a probe or director, and holding the portion of bowel back. When the water is very viscid, it will be necessary to introduce a larger trocar, or to enlarge the orifice by means of an incision. Under these circumstances it is of great benefit to use canulas which have a groove on their side, so as to facilitate the introduction of the

bistoury.—In cases of encysted dropsies, the fluid can only be let out of those cavities which admit of being punctured with safety.

Although the operation of tapping is seldom attended with hemorrhage, yet this accident sometimes occurs. Under these circumstances it is necessary to apply pressure to the wounded vessel by means of a piece of wax or gum-elastic bougie, of the size of the trocar, which is to be firmly secured on the outside of the wound, in order to prevent it from falling into the abdomen.

In cases of dropsy of the ovaria, the puncture may be made, either through the most prominent part of the swelling, or, if the tumour be very large, through the linea alba. The former method, however, is generally preferable. In other respects, the operation does not materially differ from that of paracentesis abdominis.

ABSCESSSES OF THE LIVER.

As soon as there is any sensible fluctuation, the tumour should be immediately opened, in order to prevent the matter from escaping into the cavity of the peritoneum, an accident which always proves fatal. When the abscess is somewhat pointed, and situated immediately beneath the integuments, it may be opened by means of a bistoury, as in cases of common abscesses; but, if it be more deeply seated, it will be better to make a regular incision through the skin, the muscles and parietes of the abscess. In all cases it will be necessary to make the extent of the incision proportioned to that of the abscess, taking care never to make it so large as to destroy the adhesions which the tumour has contracted with the subjacent parts and thereby cause an effusion of the matter into the abdomen. In case it is desirable to open the abscess at an early period, before the adhesions are fully formed, it may even be proper to excite inflammation in the subjacent parts, by keeping up a discharge from the most prominent part of the tumour by means of the caustic potash, and, when the eschar has separated, and the parts are sufficiently agglutinated, the abscess may be opened with the bistoury, as above explained.

With respect to the direction of the incision, it should generally be longitudinal; though sometimes it may be in the same line as the edges of the cartilages of the false ribs, more especially if the greatest diameter of the tumour extend in that direction.

When the matter has been completely evacuated, a dossil of lint, having a thread attached to its centre, is to be placed into the cavity of the abscess, and the wound is to be covered with dry pledgets, compresses and a bandage. The patient is then to be put in the most favourable position for the discharge of the matter; and at the subsequent dressings great care is to be taken to keep the edges of the wound separated until the ab-

cess is completely obliterated; a circumstance which may always be readily known by the diminution and change of the matter, which, instead of the reddish appearance which is at first presented, has now become more or less white.

Tumours of the gall-bladder.—What we have already said with respect to the opening of abscesses of the liver is equally applicable to tumours of the gall-bladder, and hydatid collections on the surface of the liver. But, as in cases of this description, the surgeon is seldom able to ascertain the extent, or even the existence of the adhesions between the tumour and the wall of the abdomen, he should never operate before he has made use of the caustic potash, as already specified. A curious instance of a hydatid cyst of the liver, in which a complete cure was effected, has lately been related by Dr. Martinet, in the Medical Review, and fully confirms the advantages of this method of treatment.

HERNIE OF THE ABDOMEN.

a.—Treatment of Herniæ in general.

I. SIMPLE REDUCIBLE HERNIE.

Indications.—The chief indications which are presented in the treatment of simple herniæ in general, are to reduce the protruded parts and to maintain them in their proper situation. The first indication is usually fulfilled by an operation called the taxis; and, with regard to the other, all that is necessary is to apply permanent pressure to the herniary opening by means of proper bandages.

Reduction.—In reducing a simple hernia, it is often sufficient to put the patient in a recumbent posture, and to apply gentle pressure upon the tumour; but in most cases it is necessary to have recourse to the taxis.

In the operation of the taxis, the patient should be placed upon his back, his head should be considerably elevated by means of pillows, his thighs and legs bent towards the trunk, and the pelvis should be a little higher than the abdomen and bent towards the healthy side. By this means the abdominal muscles will be greatly relaxed, and the operation, of course, much facilitated. When every thing is ready, the surgeon takes hold of the base of the tumour with one hand, and pushes it gently in the direction of the axis of the herniary opening, while he grasps its neck or peduncle with the thumb and fingers of the other, and first reduces the parts which are nearest the opening, and so on in regular proportion until they have all passed into the cavity of the peritoneum, taking care at the same time to prevent their descent. When the tumour is very large, its neck should be embraced with both hands at once,

in the manner we have just stated, while an assistant applies gentle and uniform pressure upon its base. If the hernia be easily reducible and is formed of a portion of intestine, it will now suddenly recede and give a peculiar noise called *gargouillement*.* In case, however, the tumour is formed of a piece of omentum, its reduction will be more slow, and no noise will be distinguishable. When the reduction is completed, it may be readily known by the entire disappearance of the protruded parts and the facility with which the surgeon is able to distinguish the herniary opening. When there is much difficulty in effecting a reduction, the tumour should be pressed in various directions, in order to empty the intestine of its fecal matter. If this, however, be not sufficient, the surgeon should change the position of the patient, and, if necessary, continue the pressure for a quarter of an hour, as advised by Sir Astley Cooper.

Retentive means.—When a hernia has been once reduced, great care should always be taken to prevent another protrusion, by the application of constant pressure upon the opening, through which it descended, by means of a truss, which must vary according to the seat and number of herniæ, the age of the subject, and a variety of other circumstances.

Too much attention can never be paid to the application of a herniary truss; because it is upon the manner in which it is adjusted, that depends not only the cure of the hernia, which may often be effected in young subjects, but also, we may say, the life of the patient. A truss, when badly applied, is worse than useless, and will always have a tendency to produce mischief.

The only kinds of trusses which should ever be used, are those which are furnished with elastic, flexible steel-springs. Those which are constructed of leather, dymity, or non-elastic metal, are generally bad; and it is only in cases of inguinal herniæ of very young children, that the surgeon should ever think of applying them; and even in these cases, a truss with a weak spring will be decidedly preferable, because, by its exerting a constant pressure upon the tumour, it will produce a more speedy and certain obliteration of the herniary sac, than those just alluded to, which, besides their liability of being every moment deranged, exert but a weak and imperfect pressure.

A herniary truss should never be applied, unless the patient lies on his back, and the hernia is completely reduced.

When the truss is properly applied, it should compress the neck of the sac and the herniary opening in such a manner, that no protrusion can possibly take place, even though the patient should make violent efforts at sneezing, coughing, or laughing. The pressure which it exerts should be constant

* This noise is generally attributed to the sudden passage of the air through the stricture.—S. D. G.

and uniform, without creating pain, or being liable to become deranged by the different motions of the body.

The first application of the truss should always be made by the surgeon, who is to explain to the patient the manner of reducing the hernia, and of keeping it in its place. The patient should also be apprized of the dangers of an imperfect reduction of the tumour, of too great or insufficient pressure, and of the necessity of wearing the bandage both at day and night, and of avoiding all violent exertion.

The patient should always be provided with two trusses, which are to be changed on going to bed; and great care should be taken to keep the parts perfectly clean, in order to prevent excoriation. When this accident, however, takes place, it may be remedied by sprinkling the parts with powdered starch, or the acetate of lead, or by covering them with compresses, dipped in some astringent lotion. If the excoriation be produced by some defect in the bandage, it should be immediately taken off, and another applied in its stead; or if it be very slight, the injured part may be protected by means of a soft compress, or by covering the truss with a hare's skin.—For a farther account of this subject, see the articles on the different species of hernia.

By a rigorous observance of these rules, and the perseverance with which they are enforced, herniæ may no doubt sometimes be cured. But, it may be stated here, as a general observation, that these cures are extremely rare, except in young subjects, and that they scarcely ever form the object which surgeons of the present day are anxious to accomplish in the treatment of herniæ which occur in adults or old people. This circumstance may be ascribed, on the one hand, to the perfection of the palliative means, which, when properly employed, render these diseases perfectly free from danger; and, on the other, to the inefficiency or serious inconveniences of the different methods of treatment that have usually been proposed by authors. Yet, notwithstanding this, there is no reason to despair of being able one day of effecting a radical cure in most cases of herniæ. That this is possible in some cases, has already been amply proved by experience; and all that remains to be done, is to discover a more speedy and effectual means than the continued pressure of a truss, which, either alone, or aided by astringent applications, is the only means exempt from danger that has hitherto been employed with any degree of success. In speaking on this subject, we shall give an account of the method of treatment of M. Beaumont, a truss-maker of Lyons, who asserts that he has employed it with the greatest success for the last twenty years, in all kinds of reducible herniæ.

The method of this gentleman consists in taking equal parts of bark and of the tender sprigs of the *æsculus hippocastanum*, which are to be reduced to ashes, and then mixed with an equal quantity of powder, composed of ʒi of cypress-nuts, ʒij of galls,

3i of some aromatic substance, and a small portion of *hernaria glabra*. This mixture is enclosed in small bags, in the proportion of one ounce for adults, and half an ounce for children, and then boiled in one part of white wine and two parts of water, until the fluid is reduced one-third. When the liquor is cold, he adds one drachm of the sub-carbonate of ammonia. When these bags are thus prepared, they are to be kept for use in the fluid in which they have been boiled. Two are generally sufficient for a patient; and in using them, they should be placed alternately under the pad of the truss, where they are to be kept for four or five hours at a time, taking care to remove them three times daily, until the patient has perfectly recovered. It need scarcely be remarked, that, while pursuing this treatment, the patient should never take off the truss.

In persons whose herniæ are difficult of reduction, or who are unable to subject themselves to those daily inconveniences, M. Beaumont puts half an ounce of pulverized opium and a small quantity of the sub-carbonate of ammonia, amongst the hairs with which the pad of the truss is usually stuffed.

By the employment of either of these methods, the skin soon becomes irritated, and a pustular irruption is the consequence. If, after some time, this portion of the integuments be pinched up, it will be found firm and resisting, indicating that it is about to become united with the subjacent parts. In order to prevent the development of the pustules, and the small ulcerations with which they are usually accompanied, a piece of fine linen should be interposed between the skin and the bag; but should this occurrence have already taken place, it must be remedied by suspending the treatment, and applying a pledget of simple cerate below the truss. In this manner a permanent cure of the hernia may generally be effected in about three months, but in some cases it will be necessary to continue the treatment for three or four years. The author of this discovery is of opinion that the cure is owing to the irritation of the skin, which is thus kept up for a long time, and is propagated to the adjacent cellular tissue, so as to produce induration and hypertrophia, and an obliteration of the inguinal ring. It matters little, however, whether this explanation be correct or not, so the facts upon which it is founded are well established; and as I can not possibly perceive any inconvenience which would be likely to arise from the treatment recommended by M. Beaumont, I can see no reason why it should not be put in practice whenever the patient is willing to submit to it.

II. IRREDUCIBLE HERNIÆ.

It sometimes happens, in cases of old, or neglected herniæ, that a reduction can not be effected, either with the taxis or any other means. This circumstance may be owing, either

to the cœcum being contained in the tumour, to the adhesion of the parts with each other, or with the bag containing them, to the thickening and contraction of the sac, or to an alteration of the omentum or mesentery, which has been suffered to lie quiet for a great length of time in the neck of the bag. When this is the case, and there are no symptoms of strangulation, the best thing to be done is to lay aside all attempts at reduction, and to employ such measures as will have a tendency to prevent the increase and inconveniences of the tumour, taking care at the same time to defend it from external injury and violence. For this purpose the tumour is to be supported by a suspensory bag, which should be well lined and kept perfectly clean, in order to prevent excoriation, at the same time that the patient is kept on a light and easily digestible diet. This precaution should also be observed after the reduction of old herniæ.

It not unfrequently happens, however, that ruptures are thought irreducible, and are treated as such, when in fact, upon more judicious and patient attempts, they are found capable of reduction. When this is suspected to be the case, the surgeon should adopt the method of the late Mr. Pott, which consists in keeping the patient in a recumbent posture, for a considerable length of time, in the employment of a low diet, and the use of evacuants and blood-letting, so as to lessen the size of the parts in the hernial sac, and render them more capable of passing back again into the abdomen. Constant pressure should at the same time be applied upon the tumour, by means of a laced suspensory bag, either alone, or aided by the application of ice, as recommended by Sir A. Cooper.

III. STRANGULATED HERNIÆ.

a.—Strangulation from the Obstruction of Fecal Matter.

Although the tumour may be indolent, the surgeon should endeavour to reduce the piece of the intestine by which it is formed, either by means of pressure, or by exciting the peristaltic motion of the bowel, by means of tonic and discutient applications. In order to reduce it, the surgeon should first try the effects of the taxis, and gently press the tumour, so as to soften the fecal matter, and dispose it to return into the abdomen, and then push the parts upwards and outwards, along the course of the spermatic cord. As soon as they begin to yield, the pressure should be gently increased; but, if they resist, it will be necessary, after having continued the taxis for a quarter of an hour, to suspend the operation. During this interval, the patient should be copiously bled, especially if he be young and plethoric, and his pulse full and hard; and while he is in this temporary weakness, produced by the sudden loss of blood, every attempt should be made to effect a

reduction. The taxis, however, should always be employed with the greatest care, and should never be continued so long as to produce much pain.

If the taxis fail, the next thing to be done, is to administer a purgative injection, composed of an infusion of senna, neutral salts and castor-oil, or a tobacco clyster, made by infusing or boiling one drachm of the plant, for ten minutes, in a pint of water. The first of these means is now alone employed in France; but the second, notwithstanding the dangers with which it is attended, is still recommended by the English practitioners. The effects of these injections should be promoted by applying cold fomentations to the tumour, or bladders of pounded ice, or cold compresses.

Cold applications are particularly useful when the hernial bag is distended with gas; and sometimes they are of themselves capable of effecting a reduction. Their application, however, must always be long continued, and, whenever there is danger of gangrene, their use must be suspended. The administration of purgatives is seldom attended with success, and should never be resorted to except in the incipient stage of the obstruction, and after the lower part of the intestinal canal has been emptied by laxative injections.

As the obstructions resulting from the accumulation of fecal matter are not usually attended with any immediate danger, the use of these different means may be continued without inconvenience for two or three days, but they should never be continued beyond this, especially in old people, on account of the debility which must necessarily result from the treatment, and particularly from the abstinence, which is required in cases of this description, as well as from the repeated vomiting, which we are frequently unable to check by the best remedies we possess, such as the saline effervescent mixture and large doses of opium.

The necessity of renouncing every attempt at reduction is imperiously indicated as soon as the hernia begins to be painful and there are evident symptoms of inflammation; under these circumstances immediate recourse should be had to the means which are usually employed in cases of inflamed strangulated hernia.

When a hernia has been reduced, and the symptoms still continue, the surgeon should lose no time in ascertaining the cause of the case, in order that he may be enabled to remedy it as speedily as possible. If they be owing to a portion of inflamed omentum, which still remains unreduced, it will be absolutely necessary to perform the operation which is recommended in cases of inflamed strangulated hernia.

If they be owing to a debilitated state of the piece of intestine that has just been reduced, which may be readily known by the constipated state of the bowels and the absence of severe inflammatory symptoms, the evil may generally be remedied by aperient drinks and cathartic injections, the use of which is

to be continued until the bowels have become opened and the symptoms of the fecal obstruction have entirely subsided.

If there be reason to conclude that these symptoms are caused by an internal strangulation, a circumstance which is always difficult to be ascertained, we should endeavour to make the tumour reappear, and proceed immediately to the operation for strangulated hernia. If this indication can not be fulfilled, the case may be considered as perfectly hopeless, and death must be the inevitable consequence.

Cases are sometimes presented in which the parts are imperfectly reduced and the truss so badly applied, as to press upon the unreduced piece of intestine and give rise to symptoms of strangulation. Under these circumstances the truss should be immediately removed, and the bowel pushed into the abdomen. When this is impracticable, all that remains to be done is to perform the operation as speedily as possible.

Another source of mischief, after the reduction of a hernia, is the descent of the whole hernial bag with the intestine, and the permanent constriction which the neck of the sac exerts upon the bowel. This occurrence may be suspected when the whole hernia has suddenly descended, without any particular noise, when the symptoms of strangulation obstinately continue, and when, on examining the ring, we discover a hard, rounded tumour, which moves whenever the patient coughs or spits. In these cases the chief indications are, to bring the hernia to its former place, and remove the strangulation. To accomplish these objects, the patient should be requested to walk his chamber, or make severe efforts at respiration, and, as soon as the hernia reappears, the surgeon should proceed to remove the constriction in the manner we shall presently state. If, on the contrary, it do not reappear, it will be necessary, without delay, to make a free incision through the ring, in order to get hold of the base of the hernia, which is to be brought down, and, after the stricture is removed, the contents of the tumour are to be pushed back into the abdomen. This operation has very recently been successfully performed at the Hôtel-Dieu.

B.—STRANGULATION FROM INFLAMMATION.

Whenever the surgeon is called to a case of strangulated hernia, he should always recollect that a patient, thus circumstanced, is in danger, and demands immediate assistance. No time, therefore, should be lost in useless attempts; but recourse should be had speedily to such means as promise to be attended with success.

If the strangulation has already existed for several hours, and there are well marked symptoms of local inflammation, and the subject is young and robust, it will be necessary to proceed immediately to the operation which is recommended for the relief of strangulated hernia.

If, on the other hand, the symptoms of strangulation are just commencing, and the tumour is not very painful to the touch, and there are no signs of severe reaction, or a disposition to inflammation, the reduction of the parts may be attempted by means of the measures which we shall now proceed to notice.

In attempting the reduction of a strangulated hernia, the surgeon should commence with the taxis, which is always the most desirable plan whenever it can be adopted. If, after a continuance of fifteen minutes, the tumour has not been reduced, the patient should be largely bled, and placed in a warm bath. The taxis is now to be again attempted, as the patient lies in the water, a situation which is peculiarly favourable for the manual efforts at reduction. All this, however, should be done as speedily as possible, and, if the bath can not be readily procured, no time should be lost in waiting for it. At the same time that the surgeon employs these measures, he should give large doses of opiates, with the view of removing the pain and vomiting which are usually attendant on strangulation. When administered freely in athletic persons after bleeding, these medicines sometimes alone succeed in procuring a reduction of strangulated herniæ. The tumour should be covered with compresses, dipped in some cold mixture; or if the progress of the inflammation be slow, it will be still better to apply leeches. When these different attempts, however, have been ineffectual, all farther efforts at reduction should be abandoned, and recourse should be had to the operation.

OPERATION FOR STRANGULATED HERNIÆ.

Apparatus.—The apparatus required for the operation of strangulated herniæ, consists of a straight bistoury, a blunt, flexible director, a pair of dissecting forceps, and blunt-pointed scissors, and the straight probe-pointed bistoury of Sir Astley Cooper.* There should also be at hand, curved needles, ligatures, sponges and warm water, and the dressings which are usually required in cases of suppurating wounds.

Operation.—After having shaved the hair from the pubes, and emptied the bladder and rectum, the patient is to be placed upon his back, in the most favourable position for relaxing the abdominal muscles. The surgeon then stands on the right side of the bed, and proceeds to the operation, which consists in dividing the integuments; dissecting down to the hernial sac, and opening it; dividing the stricture; and returning the protruded viscera into the cavity of the abdomen.

First stage of the operation.—A fold of skin is to be pinched up, at the upper part of the tumour, in a direction perpendicular to that in which the incision is designed to be made.

* The bistoury of Sir Astley Cooper is almost entirely blunt, except towards its middle, where it is sharp to the extent of a few lines.

One of the ends of this fold is to be held by an assistant on the left side of the bed, while, with a bistoury in his right hand, the surgeon makes an incision, extending from the middle to the lower part of the fold. The incision which is thus made should correspond with the mesian line of the tumour. It is likewise necessary that it should extend from its lower to within an inch above its upper part; so that it is requisite, in order to give it its proper dimensions, to prolong it both above and below the tumour. For this purpose the surgeon should raise the lips of the wound, and when the parts which form the lower angle of the tumour are well stretched, they should be divided to the desired extent. The upper angle is then to be raised in the same manner, and divided as already explained, excepting that the bistoury is to be held in the left hand. When the skin of the tumour is so tense that it can not be pinched up, it should be gradually divided from within outwards, taking every possible precaution not to interfere with the hernial sac, or the viscera which it contains. This precaution should always be particularly observed in cases of strangulated herniæ in which the operation has been previously performed, and in which circumstance, the viscera sometimes descend without being enclosed in a bag.

If, during this part of the operation, the surgeon divides any vessels, and the effusion of blood is so great as to obscure the parts, they should be immediately tied. When the skin is divided, and the edges of the wound are separated, the operator brings into view a layer of subcutaneous cellular tissue. In order to divide this without interfering with the sac, he should pinch it up with the dissecting forceps, and carry the edge of the bistoury almost horizontally, to the extent of three or four lines, through the lower parts of the tumour. This dissection should be made with the utmost precaution, lest the viscera contained in the sac be wounded.

Second stage of the operation.—Having, during the preceding stage of the operation, laid bare the peritoneal covering, which may generally be distinguished by its transparency, the surgeon now raises it gently with a pair of forceps, and divides it in the same cautious manner as the layer of the subcutaneous cellular tissue. When this covering is divided, there is generally an effusion of serum, or the intestine, which is usually of a very dark red colour, may be seen through the opening. The next thing to be done is to introduce a grooved director as far as the upper part of the tumour, and to carry upon it the curved blunt-pointed scissors, with which the sac is to be divided closely to the hernial opening. The director is then to be introduced in the same manner towards the lower part of the tumour, in order to divide the serous investment in that direction. When these incisions have been made, the viscera are no longer compressed, and suddenly increase in size. If they be sound and free from adhesions, the surgeon should endeavour to replace them, either by elevating the pelvis on

the affected side, or by pushing them gently up; but if this be insufficient, and the reduction can not be effected, he should immediately proceed to remove the stricture.

Third stage of the operation.—The edges of the wound are now to be separated near the neck of the sac, and the protruded intestine carefully held down by an assistant. The surgeon then introduces the index finger of the left hand into the place where the incision is to be made, and with a probe-pointed bistoury, guided upon it, he divides the aponeurotic edge of the hernial opening and the neck of the sac, to the extent of from three to five lines, according to the circumstances of the case. In making this incision, the bistoury is to be held in the third position, and great care is to be taken not to make any sawing motion, lest the adjacent vessels be injured. In using the bistoury of Sir Astley Cooper, it should be glided between the edges of the opening and the hernia as far as its cutting edge, when the parts are to be divided in the manner we have already stated.

Fourth stage of the operation.—The hernial opening having thus been sufficiently dilated, the protruded bowel is to be gently drawn out, and carefully examined; and if it be found to be healthy, and free from adhesions, it should be immediately replaced. In returning a piece of intestine into the abdomen, the surgeon should first introduce the part nearest to the ring, and keep it there until another portion has succeeded it. This plan is to be continued till the whole of the protruded bowel is reduced. Should there be any resistance, we should endeavour to ascertain its cause by introducing the finger into the hernial opening. Supposing, however, that the incision has been insufficient, it should be carefully enlarged in the manner we have already stated: this observation is also applicable to cases of circular strictures of the neck of the sac.

When the reduction is impeded by the protruded parts adhering to each other, or to the hernial sac, the adhesions may generally be destroyed with the fingers or the extremity of a grooved director; but, when they are firm and of long standing, we are usually obliged to divide them with the knife or scissors, guided upon the index finger. In case, however, they are very old and numerous, it will be best to let them alone, and be contented with reducing the parts which are perfectly free, leaving the others on the outside, and covering them with compresses, dipped in some mucilaginous fluid.—When two portions of intestine are agglutinated together, they should by no means be separated, more especially if they be united at an obtuse angle. In cases of congenital herniæ, in which the bowel is connected with the testicle, the adhesions should be cautiously divided with the knife, provided they be not very numerous; but in cases of an opposite description, all the parts are to be reduced en mass.—When there is adhesion between the intestine and the omentum, they should both be

reduced together, provided the latter do not also adhere to the sac.

When the portion of the bowel corresponding to the neck of the sac has a circular groove, resulting from the compression of the edges of the herniary aperture, it should be immediately reduced, unless the caliber of the intestine is very greatly diminished, or its parietes are very thickened and adherent; in which circumstances, it will be better to cut away the injured portion of the intestine, and to proceed in the manner we shall presently point out in speaking of herniæ attended with gangrene. Whatever may be the colour of the protruded bowel, so long as it retains its vitality, it should always be returned.

In case the omentum is free from gangrene, and not very much inflamed, it should always be returned after the intestine. When, however, it is much diseased, indurated, and scirrhus, as it is often found to be, after remaining for a considerable time in a hernial sac, the morbid part should either be cut away, or left on the outside of the aperture, where it will soon slough off. The same observations are applicable to cases in which the portion of the peritoneum, which is contained in the tumour, is very large and indurated, or in a gangrenous state. Before the operation is performed, however, the part should always be carefully examined, in order to ascertain that it contains no portion of the intestine in any of its duplicatures. After the operation is finished, the vessels should be taken up with a tenaculum, and tied separately with a small ligature. The healthy parts are then to be reduced, care being taken to keep those upon which the ligatures are applied, near the aperture.

Dressing.—After having reduced the parts, the surgeon should introduce his finger, for the purpose of ascertaining that they are properly returned into the abdomen, and no longer suffer constriction, either from the neck of the sac, the ring, or any of the parts just within the cavity of the peritoneum. After the parts have been well cleaned, the wound should be covered with a piece of soft cloth, upon which is to be applied a sufficient quantity of lint, and the whole is to be supported with a suitable bandage. The lint should be applied so as to fill the cavity of the wound, in order to produce suppuration and prevent another descent; and the patient should be placed in the most favourable position for the complete relaxation of the abdominal muscles.

Treatment after the operation.—Immediately after the operation, the bowels should be opened by means of clysters, castor-oil, or some of the neutral salts, dissolved in peppermint water; but the patient should not be permitted to quit the recumbent posture, as doing so has a tendency to bring on another protrusion. His diet for the first few days should be barely sufficient to support life, and he should be requested to drink plentifully of demulcent drinks. In about two or three

days, the parts are to be uncovered, and dressed like a common suppurating wound; and, as soon as the vomiting and the other symptoms of strangulation have subsided, it will be necessary to direct a more generous diet. When the wound has healed, the parts should be prevented from becoming again protruded, by applying a truss, which should afterwards be constantly worn.

Accidents.—If, notwithstanding the operation, the symptoms of strangulation obstinately continue, or even augment, as is sometimes found to be the case, the surgeon should immediately inquire into the cause of the accident, in order that he may be enabled to remedy it as speedily as possible. If they depend upon inflammation of the peritoneum or intestine, general and local bleeding, blisters and fomentations, and the various remedies that are usually resorted to in these cases should be immediately employed. If, on the other hand, they seem to be owing to an indolent and weakened state of the bowels, as often happens after the reduction of a strangulated herniæ, mild purgatives are strongly indicated. With respect to the hiccough, which sometimes obstinately persists after the parts have been reduced, it may be regarded as a nervous symptom, which may be readily subdued by the employment of liberal doses of camphor.

IV. HERNIA ACCOMPANIED WITH GANGRENE OF THE INTESTINE.

The surgeon, before he adopts a plan of treatment and gives an opinion concerning the prognosis in cases of this description, should always carefully reflect upon the progress and ordinary effects of this disease; effects which must always necessarily vary according to the kind of strangulation and the size of the mortified intestine. He should remember therefore, 1st, That when the strangulation only includes a small proportion of the diameter of the intestine, notwithstanding that the parts covering the tumour are mortified to a considerable extent, the disorganization must necessarily be limited to the injured part of the bowel, from the fact that it has contracted adhesions with the surrounding parts: and that, in most cases, the patient does not only survive this occurrence, but that the diseased intestine soon becomes more extensively adherent, that the mortified parts are detached, that the wound becomes cleanly and gradually smaller, and that the quantity of the fecal discharge by degrees diminishes, and thus enables the edges of the wound to approximate and unite.

2ndly. That almost the same circumstances take place when the chief part of the diameter of the protruded bowel has been constricted, except that the stercoracious matter is discharged in greater quantity, that the complete cicatrization is more difficult, that there often remains a more or less considerable fis-

tulous opening, and that after a cure has been effected, the patient is exposed to considerable inconvenience on account of the difficulty which the fecal matter experiences in passing through the contracted part of the bowel.

3rdly. That when a large part of the bowel is in a gangrenous state, the mortification will either spread to the rest of the intestinal canal, and the patient die, or an artificial anus will be the consequence. When this latter circumstance occurs, the two ends of the bowel, after the mortified part has separated, are drawn back by the retraction of the mesentery, and are united at a more or less obtuse angle. The portion of the neck of the sac by which they are surrounded, and which has become united with them, forms what Scarpa has called the membranous funnel, the apex of which corresponds to the wound, and the base to the intestine. This double retraction is much more rapid, according as the hernia is small, and of short standing, and proportioned to the size of the neck of the sac. As this retraction takes place, the edges of the wound become gradually approximated, at the same time that the most external part of the membranous cavity is closed, while that which unites the extremities of the bowel becomes more and more enlarged. If the retraction now cease, most of the fecal matter, which is poured into this conoid cavity, will pass through the external opening, which will remain in a fistulous state for an indefinite length of time; if, on the contrary, it continue, the two ends of the intestine will soon become united at an angle more or less acute, and the quantity of the discharge will lessen as the wound heals, and the patient get perfectly well. The cure, of course, will be more rapid when the bowel is mortified only in a part of its diameter; and more protracted and difficult in cases in which there is a considerable loss of substance. In the first case, indeed, the two ends of the intestine are placed almost upon the same line, and remaining still in contact, the feces are only partially discharged through the mortified aperture, and as they resume their former route to the rectum, the external wound is gradually closed up. In the second case, on the contrary, the two ends of the intestine are united at a more or less acute angle on the side of the mesentery, and being but slightly in contact, they form a kind of projection, which intervenes between the two orifices, and always destroys more or less completely the passage of the matter into the inferior end of the bowel.

Treatment.—When a small portion of the protruded intestine is found to be in a gangrenous state, the hernial sac should be immediately laid open, the mortified parts cut away, and, if the bowel be not open, an incision should be made through it, in order to give exit to the accumulated matter. In these cases, the division of the stricture is only indicated when the stercoracious matter can not escape with facility through the hernial opening, and then the incision should only be small,

for fear of destroying the adhesions which the bowel has contracted with the adjacent parts, and thus produce an extravasation into the abdomen. When these first indications have been fulfilled, the wound should be carefully washed with a mixture of tepid wine and water, and covered with pledgets of simple cerate, or syrax ointment; the patient should be put on the use of mild laxatives, and the dressings should be renewed as often as circumstances may indicate; care being taken at each time to wash the parts with some emollient decoction. The evacuation of the contents of the bowels should be promoted by the daily administration of one or two injections, and some aperient drinks. The diet of the patient should at first be restricted to broths; but after the separation of the sloughs, he should be directed to make use of more nourishing and easily digestible food. This is all that is necessary on the part of the surgeon; nature will do the rest. But if, notwithstanding the employment of these means, the feces still continue to be discharged through the wound, or the orifice of the bowel is so much contracted that they can not pass, it will be necessary, instead of promoting the cicatrization of the wound, to keep its edges constantly separated, in order to prevent the retention of the fecal matter. For this purpose, the surgeon should form an artificial anus, by introducing a tent of lint into the aperture, which is to be renewed daily until the edges of the intestine have become firmly agglutinated to the adjacent parts.

When the whole of the diameter of the protruded intestine is mortified, the conduct of the surgeon must vary according to the nature of the case. Thus, when the bowel is adherent to the sac, it should be freely opened, in order to give exit to the accumulated feces, and the surgeon is then to proceed as in the preceding case. If, however, it lies loose in the sac, as it is most frequently found to be the case, it should be gently drawn out, in order to ascertain the extent of the gangrene, and the diseased part cut away, taking care not to carry the instrument through any of the sound parts. When this has been done, it will be most prudent to follow the advice delivered by Richter and Scarpa, which is to cover the parts with light compresses, dipped in a decoction of marsh-mallows, and to enjoin the most perfect quietude. By this treatment, the two ends of the intestine will gradually fall into the abdomen, and the membranous funnel, to which we have already alluded, will soon establish a communication between them. In order to promote both the dilatation of this membranous funnel, and the depression of the fleshy projection which it contains, the patient should be allowed to take plentifully of nourishing and easily digestible food, and his bowels should be frequently emptied by mild purgatives and injections. If the feces now gradually resume their former route to the rectum, without giving rise to frequent colicky pains, the artificial anus may be closed; but, should this not take place, the external

aperture should be carefully kept open by the daily introduction of a tent of lint into the upper orifice of the intestine.

B.—Particular Herniæ.

INGUINAL HERNIA.

Reduction and retentive means.—In reducing an inguinal hernia, the patient is to be placed, as we have already stated in the general observations on herniæ, in the most favourable position for relaxing the abdominal muscles, and the parts are to be pushed obliquely from below upwards, and from within outwards, in the direction of the inguinal canal. When the tumour is completely reduced, it should be prevented from again descending by the use of a proper truss. In applying this instrument, the patient should be placed in a recumbent posture, and while the fingers are applied upon the hernial opening, in order to prevent the parts from being protruded, the surgeon places the truss in such a manner, that the pad shall compress the neck of the hernial sac, and the upper portion of the inguinal ring. If the truss be in danger of slipping upwards, it should be prevented by the employment of a thigh-strap. When the instrument is properly applied, it should give no pain or inconvenience, and the pad should rest firmly and steadily against the inguinal ring, without leaving the least interspace between it and the skin.

When the hernia, however, is strangulated, and the removal of the stricture becomes necessary, the surgeon should immediately have recourse to the operation.

ANATOMY OF INGUINAL HERNIA.*

On raising the integuments of the abdomen, the surgeon will find a thin compact layer of cellular substance, described by modern anatomists under the name of fascia superficialis. It not only covers the abdominal muscles, and their tendons, but it extends in different directions, and forms a general investment to the body. It increases in thickness towards the lower part of the abdomen, and is firmly united to Poupart's ligament, and to the surface of the spermatic cord. Beneath the fascia, and intermingled with its fibres, are numerous lymphatic glands, and on its external surface are two vessels, branches of the external pudic artery and vein, which pass over the edge of Poupart's ligament, towards the umbilicus, and are liable to be wounded in the operation for inguinal or crural hernia.

The aponeurosis of the external oblique muscle being ex-

* By the translator.

posed by the removal of the fascia superficialis, the tendinous fibres which compose it will be observed gradually to separate as they approach the crista of the pubes, and to be aggregated into two bundles, leaving between them a triangular opening, called the external abdominal ring, which is usually more capacious in the male than the female subject. The supero-internal pillar of this aperture, is inserted into the symphysis of the pubes, and is the weakest of the two; the infero-external one, which is the strongest, is chiefly a continuation of Poupart's ligament, and is attached to the angle and crista of the same bone.

When the aponeurosis of the external oblique is cut away, or reflected down on the thigh, the internal oblique muscle is brought into view, and also the cremaster, which is given off from its lower border, and thence prolonged upon the cord, with which it passes through the external abdominal ring. The lower margin of the internal oblique arises from the inner surface and outer half of Poupart's ligament, and passing over the spermatic cord, in a vaulted form, is inserted into the symphysis pubis.

The lower edge of the transversalis muscle, like that of the internal oblique, arises from the external half of Poupart's ligament, crosses over the spermatic cord, and uniting its tendon with that of the internal oblique, is inserted into the pubes.

Behind the transversalis muscle, and closely adherent to it, is a thin, smooth membrane, usually called the fascia transversalis, or fascia Cooperi, in honour of Sir Astley Cooper, its discoverer. It proceeds from the inner edge of Poupart's ligament, covers the whole of the lower part of the abdomen, ascends to the diaphragm, and passes out along with the femoral vessels. It forms the only partition between the peritoneum and the outer opening of the abdominal ring, and were it not for its existence, inguinal hernia would probably be much more frequent.

At the lower part of this fascia, about half an inch above Poupart's ligament, and midway between the spine of the ilium and the symphysis pubis, is an opening for the passage to the spermatic cord, called the internal abdominal ring.

The spermatic cord, composed of arteries, veins, lymphatics, nerves, the vas deferens, and a membranous sheath, enters the internal abdominal ring, and passes obliquely downwards and forwards, between the fascia Cooperi and the aponeurosis of the external oblique muscle, to the opening of the external ring. When arrived on the smooth surface, immediately behind the ring, it describes an obtuse angle, and passes forwards and downwards into the scrotum.

The two abdominal rings are about an inch and a half from each other, and between them is the inguinal canal which gives passage to the spermatic cord.

The epigastric artery, which is so materially concerned in the operation for strangulated inguinal hernia, runs near the

external side of the abdominal ring, between the fascia transversalis and the peritoneum. It arises from the external iliac artery, a short distance from the crural arch, and about an inch below the convexity of the great bag of the peritoneum. The space between this convexity of the peritoneum, and the origin of the artery is filled up by a considerable quantity of cellular tissue, which is continued over the spermatic cord, and the femoral vessels. The epigastric artery, originating sometimes from the inside, and sometimes from the front part of the external iliac, by forming with the latter vessel a more or less acute angle, conceals itself almost immediately under Poupart's ligament, and the aponeurosis of the internal oblique and transverse muscles. Thence, passing over the convexity of the peritoneum, it ascends obliquely towards the rectus muscle. In its course near Poupart's ligament, it is crossed by the spermatic cord.*

Operation for inguinal hernia.—The operation for strangulated inguinal hernia differs from that which we have described in the general observations on herniæ, only in the following points. The incision, commencing half an inch above the external angle of the ring, and extending as far as the lower part of the tumour, is to be carried obliquely from above downwards, and from without inwards, throughout its whole extent, if the tumour be confined to the groin; but when the hernia is large and descends as far as the base of the scrotum, it will be necessary, after having arrived at the root of the penis, to make a curved incision, which is to pass obliquely downwards and inwards, over the middle of the tumour to its lower part. In making this incision, great care should be taken not to deviate from the line just mentioned, for fear of wounding the vessels of the spermatic cord, which, in cases of large herniæ, are frequently separated at some distance and situated upon the lateral parts of the sac, instead of being at its posterior part, as is generally found to be the case in recent herniæ. When the hernial sac is fairly brought into view, it should be opened at its lower part, where it is usually separated from the intestine by a considerable quantity of serous fluid. The incision is then to be extended upwards to the distance of six or eight lines, and downwards as far as the lower part of the sac. In cases of congenital herniæ, however, this membranous investment should be divided only as far as the point corresponding to the upper part of the testicle.

When this incision is made, the surgeon should proceed to divide the inguinal ring and neck of the sac. This step of the operation requires the greatest attention on account of the presence, behind the ring, of the epigastric artery, which, when

* See Scarpa's Treatise on Hernia, translated by Wishart—Colles' Surgical Anatomy—Lawrence on Ruptures—Hesselbach über den Ursprung der Leisten-und-Schenkelbrüche—Sir Astley Cooper on the Anatomy and Surgical treatment of Inguinal and Congenital Hernia—Gibson's Surgery—J. Cloquet, Recherches Anatomiques Sur Les Hernies—Cooper's First Lines.

injured, almost always produces fatal hemorrhage. The impossibility of knowing whether the hernia be internal or external, and whether consequently the artery be on the outer or inner side of the tumour, has induced surgeons to devise a more certain method of avoiding this vessel, whatever may be its situation; this method, which has been more particularly recommended by Scarpa and Dupuytren, consists in cutting directly upwards, parallel with the linea alba, in such a manner that the incision shall form a right angle with the horizontal ramus of the pubes. A small incision is generally sufficient to allow of the reduction of the protruded parts; and it will be much better to dilate it afterwards than to make it too large in the first instance.

In cases of very old and large strangulated herniæ, this operation is seldom necessary, the surgeon being generally able to subdue the symptoms of the strangulation by the employment of injections, the warm bath, and emollient fomentations. When the operation, however, becomes necessary, it should be performed as in every other case accompanied with gangrene; but, should this not be present, it will be sufficient to make an incision from two to three inches in length, through the integuments covering the inguinal ring, and to divide the edge of the aponeurotic opening by means of a bistoury, guided upon a grooved director. The reduction of the protruded parts should then be attempted; but if there be any strong adhesions, they should be left in the hernial sac. When the stricture can not be properly removed without interfering with the neck of the sac, it will be necessary to open it at the place through which the ring has been divided. This step is more particularly requisite in cases in which the size of the hernia or its adhesions are so great as to render the reduction of the parts impracticable.

CRURAL HERNIA.

Reduction and retentive means.—In order to reduce a crural hernia, the patient should be placed upon his back, and the thighs should be bent and turned inwards, in order to relax the crural arch. The surgeon then presses the parts, at first downwards and backwards, in order to destroy the angle which is formed by the body of the tumour with its neck, and afterwards upwards and slightly inwards, for the purpose of enabling the viscera to pass under the crural arch. As soon as the reduction is effected, the patient should be obliged to wear a truss; taking care to observe the precautions which we have already stated.

When a crural hernia becomes strangulated, the taxis should never be too long continued; because the hernial opening is so narrow that the parts would only be irritated and become inflamed.

ANATOMY OF CRURAL HERNIA.*

The contents of a femoral or crural hernia, instead of passing through the abdominal rings, are protruded beneath Poupart's ligament through an opening termed the crural ring. This ring is bounded on the outer, or iliac side, by the femoral vein, on the inner, or pubic side, by Gimbernat's ligament, anteriorly by Poupart's ligament, and posteriorly by the pubes. Poupart's ligament arises from the spine of the ilium, and is implanted by a broad insertion into the symphysis pubis, into the tuberosity of the pubes, and into the ligament of the pubes over the linea ileo-pectinea. By this last insertion a sharp crescentic edge is formed, the concavity of which looks towards the crural vein, and is supposed by most writers, to contribute mainly to the constriction in cases of strangulated crural hernia. From having been particularly described by Gimbernat, a Spanish surgeon, it is frequently called Gimbernat's ligament. There are two margins to Poupart's ligament, an anterior and posterior, the former of which is straight, the latter concave, in the vicinity of the pubes.

The fascia lata of the thigh, as it approaches Poupart's ligament, divides into two portions—the iliac and pectineal. The former is connected to Poupart's ligament throughout the greater part of its extent, the latter is attached to the pubes, covers the muscles that spring from that bone, and unites with the iliac portion below, at the spot where the vena saphena major enters the femoral vein. In thickness and strength the iliac portion of the fascia lata greatly exceeds the pectineal portion. It lies, moreover, considerably above the plane of the latter, and covers the femoral vessels, the anterior crural nerve, and the iliacus internus and psoas muscles. Towards the pubes its edge is concave, and on this account was denominated by Burns, of Glasgow, the falciform process. Its superior horn received from Mr. Hey the appellation of femoral ligament, and is at the present day commonly known under the name of Hey's ligament. "It has already been stated," says Colles, "that the iliac portion of the fascia lata passes before the femoral vessels. We observe in this part of its course, that it loses somewhat of its strength and firmness of texture; however, in general, it retains a good deal of its ligamentous nature even when it has reached the pubic side of these vessels; except in the immediate neighbourhood of the vena saphena, where it differs but little from the cellular substance. Having passed before the femoral vessels, we find it now descend on their pubic side; and here we see it attach itself very intimately to the pectineal fascia. This attachment is made in a straight line along the pubic side of the vein, from the place of the insertion of the saphena to within a quarter of an inch

* By the translator.

of Poupart's ligament. At this place we observe, that the line of attachment is curved; and having here formed a sweep towards the pubes, that the attachment now takes place in a line across the top of the thigh."

Beneath the fascia lata and in immediate contact with the femoral vessels lies the fascia transversalis. This fascia, as formerly mentioned, under the head of inguinal hernia, not only lines the internal surface of the abdomen, but passes out upon the thigh under the posterior edge of Poupart's ligament. Descending in front of the crural artery and vein, it becomes united to their sheath and forms for them an additional investment. On the inner side of the crural vessels numerous absorbents may be observed passing through the transversalis fascia on their way to the abdomen.

The fascia iliaca is but a continuation of the fascia transversalis, and differs from it only in situation. It lines the surface of the iliacus internus and psoas muscles, adheres to the posterior margin of Poupart's ligament, descends with the crural vessels to the thigh, and affords them posteriorly a strong investment. The union of the fascia transversalis and iliaca has been compared, not unaptly, to a compressed funnel, the expanded part of which may be said to occupy the lower part of the abdomen and hollow of the ilium, while the pipe is represented by the prolongation which covers the femoral vessels and forms their anterior and posterior sheaths.

Although the space between the os innominatum and Poupart's ligament is filled up by the iliacus internus and psoas muscles, these would not prove a sufficient barrier to the descent of a femoral hernia in various situations between the spine of the ilium and symphysis pubis. Such descent, however, is effectually guarded against, except at the crural ring itself, by the union of the fascia transversalis and iliaca. These fasciæ, indeed, are so closely connected with each other, with the posterior edge of Poupart's ligament, and with the surface of the psoas and iliacus internus muscle, and send off so many partitions between the crural artery and vein, and the adjoining parts, as to preclude effectually the escape of any of the viscera between them.

In dissecting the parts concerned in crural hernia, it is important to notice particularly the situation of the spermatic cord and epigastric artery. The former lies about half an inch from the mouth of the sac, above Poupart's ligament; the latter runs upon the outside of the hernial sac, and takes a course upwards and inwards on its way to the rectus muscle. Sometimes the obturator artery is sent off by the epigastric, and running along the inner margin of the sac is liable to be wounded, in performing the operation for strangulated femoral hernia, if the incision be prolonged too far inwards or towards the pubes.

A portion of omentum, or intestine, surrounded by the peritoneum, having entered the sheath of the femoral vessels,

formed by the union of the iliac and transversalis fasciæ, passes along the inner edge of the crural vein, and carries before it the loose cellular membrane that naturally occupies the orifice of the crural ring. This membrane, which has received from Sir Astley Cooper the name of fascia propria, being pushed forward by the hernial sac, is carried along with it through one or more of the holes on the inner side of the crural sheath, and uniting with that sheath the two fasciæ, are "consolidated into one." Above the fascia propria will be found the superficial fascia and the integuments. If a dissection, therefore, be made of a femoral hernia commencing at the surface of the bend of the thigh, the parts will be presented in the following order:—the integuments, superficial fascia, fascia propria, hernial sac. This last will be found resting in the hollow between the iliac and pectineal portions of the fascia lata, and consequently on the outer surface of that aponeurotic expansion. There is a variety, however, of femoral hernia, (in which the sac and its contents, not passing through the absorbent holes, is continued along the sheath of the femoral vessels,) covered by the fascia lata.—*Gibson's Surgery*. vol. ii. p. 297.

Operation.—The patient being placed in the same posture as in the operation for the taxis, the surgeon makes an incision through the middle of the tumour, commencing one inch above the crural arch, and extending obliquely downwards and outwards, as far as the lower part of the hernia. When this incision, which should only embrace the integuments, is completed, the next thing to be done is to divide the fascia transversalis, unless this has been already done in making the incision through the skin, to which it intimately adheres, and to expose the tumour by cutting through the third investment—the fascia propria: this cellular envelope is to be pinched up with a pair of dissecting forceps, and carefully divided layer after layer. After having arrived upon the hernial sac, it is necessary, observes Sir Astley Cooper, "to pinch up a small part of it between the finger and thumb; to move the thumb upon the finger, by which the intestine is distinctly felt, and may be separated from the inner side of the sac; and then to cut into the sac, by placing the blade of the knife horizontally. Into this opening a director should be passed, and the sac opened from its fundus to the crural sheath." In dividing the stricture according to Gimbernat's method, the surgeon introduces a small grooved director between the internal side of the intestine and neck of the sac. The instrument is to be directed obliquely inwards, till it enter the crural ring, which will be known by the increased resistance, and by its point resting upon the ramus of the os pubis. The introduction is then to be suspended, and keeping the director firmly resting upon the bone just mentioned, (with the left hand, if you are operating on the right side, and vice versâ,) so that its back shall be turned towards the intestine, and its groove towards

the symphysis pubis, the surgeon introduces gently with the other hand, into the canal of the director, a convex bistoury with a narrow blade and blunt point, until it enter the ring. With this instrument he then divides, at once, the neck of the sac and the base of Gimbernat's ligament, to the extent of four or five lines, by which the arch, forming the strangulation, will be considerably relaxed, and the parts will be reduced with perfect ease.—This direction is always to be taken in dividing the stricture of femoral hernia in the male subject; in the female, on the contrary, the incision should be made directly upwards, parallel with the linea alba. All the inconvenience that can possibly result from this method is the danger of wounding the round ligament; yet even this can be of little importance, except in cases of pregnancy.

UMBILICAL HERNIA.

Retentive means.—The protruded parts of umbilical herniæ, in very young subjects, may generally be kept in their proper place by means of a graduated compress and a bandage, applied so as to facilitate the approximation of the sides of the hernial aperture, and to effect a permanent cure.

Umbilical herniæ of adults, are to be treated on the same principles as those of children. For this purpose the compression may be made either with a spring truss, with a semi-circular pad, or a linen belt with spiral springs, having a soft convex pad, proportioned to the size of the hernia.

Division of the stricture.—As the symptoms of a strangulated umbilical hernia are always more intense, and gangrene comes on more rapidly, than in any other species of rupture, the operation should be performed as early as possible; for if done too late, it will frequently be unfavourable. If the first attempts at reduction have been unattended with success, the surgeon should lose no time in making a longitudinal, or crucial incision through the middle of the tumour, according to the volume of the protruded parts.* When the hernial sac is brought fairly into view, the stricture is to be divided directly upwards, in the course of the linea alba.†

In cases of very large umbilical herniæ, which are free from gangrene, and difficult of reduction, we should always adopt the plan suggested, and successfully practised by Sir A. Cooper, which consists in making an incision just sufficient to

* This incision, which should be made so as to extend only through the integuments, always requires the greatest precaution, on account of the thinness of the hernial investments.

† In the true umbilical hernia, the stricture is usually formed by the aponeurotic aperture in the linea alba; but in some instances the neck of the hernial sac itself is thickened, and prevents the reduction of the parts.—S. D. G.

divide the stricture, without opening the sac, or at all events, no more of it than can absolutely be avoided.

VENTRAL HERNIA OF THE LINEA ALBA.

Ventral herniæ require the employment of an elastic belt, which is to be laced in front over a convex pad, proportioned in size to the extent of the separation of the recti museles.

In cases of strangulated ventral herniæ, the surgeon should always give a fair trial to the taxis before he proceeds to the operation of dividing the stricture. If an operation, however, becomes necessary, it should be performed in the same manner as in cases of umbilical herniæ. In very large ventral herniæ, the operation recommended by Sir A. Cooper, of dividing the stricture, without opening the sac itself, may be adopted with advantage.

PUDENDAL HERNIA.*

This is the name assigned by Sir Astley Cooper, to the hernia which descends between the vagina and the ramus of the ischium, and forms a tumour in the labium, capable of being traced within the pelvis, as far as the os uteri.

When reducible, a common female bandage, or the truss used for prolapsus ani, should be worn. A pessary, unless very large, could not well keep the parts from descending, as the protrusion happens so far from the vagina. Sir A. Cooper is of opinion, that when strangulated, this hernia, in consequence of the yielding nature of the parts, may generally be reduced by pressing them with gentle and regular force, against the inner side of the ramus of the ischium. If not, the warm bath, bleeding, and tobacco clysters, are advised. When an operation is indispensable, the incision should be made in the labium, the lower part of the sac carefully opened, and with a concealed bistoury, directed by the finger, in the vagina, the stricture should be cut directly inward, towards the vagina. The bladder should be emptied both before the manual attempts at reduction and the operation.—*See Sir A. Cooper on Crural Hernia.*

ACCIDENTAL ARTIFICIAL ANUS.

Palliative treatment.—The palliative treatment of an artificial anus, is intended chiefly to remedy the inconveniences which result from this affection, and to prevent the unpleasant effects to which it may give rise. The first indication is fulfilled by keeping the parts perfectly clean by frequent ablutions, and by preventing the fecal matter from soiling the pa-

* By the translator.

tient's clothes, by means of Juville's machine, or any other constructed upon the same principle, and kept applied to the fistulous opening. The second indication is fulfilled by obviating the too quick escape of the intestinal matter, and the protrusion of the two ends of the bowel.

Inanition is seldom to be apprehended when the injury is seated towards the inferior part of the small intestines, or along the course of the large ones. If the intestinal canal, however, be wounded high up, and the chymous matter is discharged before chylification and the absorption of the chyle have taken place, a circumstance which may always be known by the soft and lactescent appearance of the discharge, it will be necessary, in order to support the life of the patient, to enjoin the most perfect rest, to prescribe succulent and easily digestible food, to allay the irritation of the intestines, by means of opiate and demulcent remedies, and to keep the food as long as possible in the intestinal tube, by means of pressure, applied over the fistulous aperture.

In order to prevent the protrusion of the ends of the intestine, and the formation of the soft, red, and painful projecting ridge, which is usually presented in cases of artificial anus, the opening should be closed with a linen tent, or stopper, covered with a pad of lint, a few compresses, and a moderately tight bandage. If this projecting ridge, however, already exists, is large, thick, and indurated, we should endeavour to remove it by a continued and graduated compression, by means of an elastic bandage, and request the patient to abstain from all violent exertion, to keep his bowels freely open by the use of mild purgatives, and to take none but mild and easily digestible food. In case the tumour has become irreducible, all that can be done is to support it, and prevent its increase by covering it with a thin piece of metal, and a proper bandage. When there are symptoms of strangulation, however, which do not yield to the ordinary measures, it will be necessary to make a sufficiently large incision, with a bistoury, directed by the fore-finger, through the integuments which surround the base of the tumour, as well as the end of the intestine which adheres to it.

Radical treatment.—The French surgeons are at present generally in the habit of employing two methods for the purpose of effecting a radical cure in cases of artificial anus. The one, which has been suggested, and practised by the celebrated Desault, consists in pushing back the projecting angle, which is formed at the junction of the two ends of the intestine; and the other, which has been lately proposed by Professor Dupuytren, consists in exciting adhesion between the two agglutinated portions of the bowel.

OPERATION FOR ARTIFICIAL ANUS.

a.—According to the method of Desault.

After having reduced the tumour formed by the protruded intestine, or after having cut it away, as has been recommended by Professor Dupuytren, if it be irreducible, and has several fistulous openings, the surgeon should daily introduce long dossils of lint into the two ends of the bowel, and gradually alter their direction so as to bring it into a straight line, at the same time that he destroys the projecting ridge, in order that the feces may resume their natural route. When this desirable change has been effected, and the dilatation is sufficient, the long dossils are to be discontinued, and a linen tent is to be introduced in their stead, with the precaution of not passing it in too deeply, lest it obstruct the natural course of the feces. At the same time that this treatment is pursued, the patient should be put on the use of injections and mild purgatives. At first, wind will be discharged through the rectum, and soon afterwards the feces will begin to come away. This method, when skilfully managed, will not unfrequently be attended with success; but when the angle formed by the two portions of the intestine is very acute, it will always fail, and should then be superseded by the method of Professor Dupuytren.

b.—According to the method of Dupuytren.

Having ascertained the situation of the two ends of the intestine, the surgeon introduces one of the blades of the enterotome* into each portion of the gut, in such a manner that they shall embrace the septum or ridge, which it is intended to destroy. When the blades are properly applied, "the instrument is to be moderately closed, by means of a screw. During the first day, the pressure should be barely sufficient to keep the parts in immediate contact; but after this, it should be gradually increased, taking care, however, not to make it so severe as to produce violent pain and suffering. Under ordinary circumstances, no unpleasant symptoms interrupt the progress of the operation, and between the fourth and sixth day, the parts are firmly agglutinated together. Notwithstanding this, however, it will be necessary, during the course of the treatment, to resort frequently to the application of the instrument, on account of the flattening which is experienced by the compressed membranes. The part of the forceps, situated externally to

* This instrument is nothing but a pair of forceps of particular construction.—S. D. G.

the ridge, or septum, should be covered with lint and compresses; and the patient should be confined to the most perfect rest, be requested to drink plentifully of diluent drinks, and make use of light and digestible food, taken in small quantities, and at proper intervals. The time when the forceps are to be removed must vary according to circumstances. They generally, however, fall off about the twelfth day, and sometimes as early as the eighth."—*Méd. Op. de Sabatier, Sanson et Begin's edition.*

When the projecting ridge, or septum, is completely destroyed, the fistulous aperture may be healed by forcing the feces to resume their former route through the rectum. For this purpose it will generally be sufficient to make even and continued pressure upon the opening, by means of a few compresses and a truss.

Whatever may be the plan that is adopted, the cure of an artificial anus will always require a considerable time; and sometimes it will be even impossible to effect it. Whenever a cure is effected, it will be necessary, in order to obviate a relapse, to which the patient is always extremely liable, to prescribe light and digestible food, to request the patient to avoid all violent exertion, and to wear continually an elastic bandage, applied so as to exert a moderate and uniform compression on the part.

LIGATURE OF THE AORTA.*

This formidable operation was performed by Sir Astley Cooper, in 1817, at Guy's Hospital, in a case of aneurism of the primitive iliac artery, where it presented the only chance of preserving the life of the unhappy patient.

Having previously emptied the bowels by active aperient medicines, the patient was placed upon his back, and his shoulders were gently elevated, so as to relax, as much as possible, the abdominal muscles. A slightly curved incision, about three inches in length, was then made along the left side of the umbilicus, parallel with the linea alba; and, after having thus divided the integuments and muscles, a small aperture was made into the peritoneum, so as to admit of the introduction of the fore-finger. This opening was then enlarged by means of a probe-pointed bistoury to nearly the same extent as the external incision, and the finger passed between the intestines to the spine, where it felt the pulsations of the aorta. Sir Astley then scratched through the peritoneum on each side of the vessel, and gradually passed his finger between it and the spine. While holding his finger in this situation, he passed a blunt aneurism-needle, armed with a single ligature, behind the artery, and then withdrew the instrument.

"The next circumstance, which required considerable care,

* By the Translator.

was the exclusion of the intestine from the ligature, the ends of which were brought together at the wound, and the finger was carried down between them, so as to remove every portion of the intestine from between the threads: the ligature was then tied, and its ends were left hanging from the wound. The omentum was drawn behind the opening as far as the ligature would admit, so as to facilitate adhesion; and the edges of the wound were brought together by means of a quilled suture and adhesive plaster."

The patient died about forty hours after the operation.—See Cooper and Travers's *Surgical Essays*, Part 1, p. 99.

LIGATURE OF THE COMMON ILIAC ARTERY.*

The operation of tying the common iliac artery was first performed in 1812, by Dr. Gibson, professor of Surgery in the University of Pennsylvania, and a few years ago by Dr. Mott, of New York, for the cure of a large aneurism, which extended from Poupart's ligament to some distance above the origin of the internal iliac artery.

Mott's operation.—*Apparatus.*—A scalpel, and the set of instruments described in the observations on tying the arteria innominata.

Having placed the patient upon his back, Dr. Mott made an incision through the tendon of the external oblique, and through part of the origins of the internal oblique and transversalis muscles, extending from the external abdominal ring to one or two inches above the crest of the ilium. He then cautiously raised the peritoneum with his fingers, and succeeded in detaching it entirely from the tumour and vessels, without doing it the slightest injury. The artery was then examined, and the aneurismal dilatation was found to cease at about half the distance between the bifurcation of the aorta and the origin of the internal iliac branch. The vessel was next separated from the iliac vein, and secured with a round silk ligature.—See the *Phila. Journ. of the Med. and Phys. Sciences*, May 1827.

SECTION V.

Of the Diseases of the Pelvis.

I.—DISEASES OF THE SEXUAL ORGANS OF THE MALE.

PHYMOSIS.

When the phymosis is recent, and attended with swelling and inflammation of the glans, or prepuce, the penis should

* By the Translator.

be frequently immersed in a tepid bath, and leeches should be applied in the neighbourhood of the affected part. The patient should be put on the use of diluent drinks and a proper diet, and the end of the penis should be kept upwards, and covered with an emollient poultice. As soon as the swelling has somewhat subsided, a tepid solution of the acetate of lead should be injected beneath the prepuce, and compresses, wet with the same fluid, should be continually kept on the parts.

When these means are unattended with success and the phymosis is of long standing, and appears to be owing to the presence of ulcerations on the glans, it will be necessary to have recourse to the operation for phymosis; which consists in making an incision through nearly the whole length of the prepuce, in the direction of the penis, or in making three or four small incisions, equi-distant from each other, through the anterior-third of this covering, with a narrow bistoury, the point of which is to be carried between the glans and the prepuce, and then raised, so as to cut from within outwards.

When the prepuce adheres to the glans, the conduct of the surgeon must be regulated by the circumstances of the case. When the adhesions are partial, the incision must be made as under ordinary circumstances, but in the place which appears free from adhesions, and where, consequently, a grooved director may be readily introduced. But if the adhesions be general, the skin should be pinched up so as to form a transverse fold, which is to be divided from its middle to its base, care being taken not to injure the glans. The prepuce is then to be drawn back, in order to stretch the bands by which it is united to the glans, and, as they are brought into view, they are to be divided with the point of a bistoury. When the operation is finished, and the bleeding arrested, the parts should be covered with fine lint and a bandage, which will be hereafter described.

When, in case of phymosis, the prepuce is affected with disagreeable sores, and scirrhous excrescences, and appears to be more injurious than useful, the best thing that can be done is to remove it with the knife. This operation may be performed in two ways: if the prepuce be diseased in a great part of its extent, the surgeon should make an incision through the whole length of its upper part in the direction of the penis, with a narrow bistoury, guided upon a grooved director, which is to be passed between it and the glans. A triangular flap is then to be cut away on either side with a pair of sharp scissors. This second step of the operation is indispensably necessary, because the two edges of the wound would otherwise give rise to a disagreeable deformity and be injurious in copulation. If, on the contrary, the prepuce be only affected towards its free extremity, as well as when it is too long, recourse must be had to the operation of circumcision.

CIRCUMCISION.

Lisfranc's method.—"The method of this gentleman consists in pinching up the prepuce at its loose extremity, with three forceps, and in drawing it forwards. The surgeon then takes hold of the membrane with a pair of dressing forceps, between the forceps held by the assistants and the extremity of the glans penis, and cuts off as much as he wishes with one sweep of the scissors."

Dressing.—See the operation for phymosis.

A congenital phymosis may be remedied by means of an operation which consists in slitting open the prepuce, and in healing the edges of the incision separately. The best plan which can possibly be adopted for this purpose, is that which has lately been proposed by M. J. Cloquet, and the superiority of which we have several times seen exemplified in the treatment of this affection.

OPERATION FOR PHYMOSIS.

According to the method of M. J. Cloquet.

The patient being seated in a chair, or placed upon the edge of a bed, the surgeon raises the penis with the left hand, and introduces a grooved director between the glans and prepuce, along the frænum, taking care that the canal of the instrument be directed towards the integuments. When it has arrived at the base of the glans, the surgeon should give it to an assistant, or hold it between the thumb and fore-finger of the hand which supports the penis. Having done this, and carefully tightened the prepuce, a narrow, sharp-pointed bistoury, held in the right hand, as in making an incision from within outwards, is to be carried through the skin upon the extremity of the director, in the groove of which it is to be glided from behind forwards, so as to divide the prepuce in its whole length. The frænum is then to be divided with a single sweep of the scissors, and the prepuce is to be drawn towards the glans, in order to separate the two flaps. The wound, however longitudinal it may be, will thus become transverse, and if the parts are kept in this position for a few days, no deformity will remain, except an indistinct linear cicatrix.

Dressing.—After having allowed the parts to become disgorge, and carefully wiped them, the wound should be covered with a few pledgets of dry lint, and a four-tailed compress, perforated in its middle, so as to give free vent to the urine, and the whole is to be supported by means of a long narrow roller, carried from the glans to the root of the penis. The dressings should be removed about the fourth or fifth day; after which they are to be applied as already directed.

PARAPHYMOSIS.

As the stricture in this case may give rise to very disagreeable consequences, it should always be removed as speedily as possible, whatever may be the degree of swelling and irritation which may be likely to result.

If the paraphymosis be of short standing, and attended with but little pain, it may be reduced by taking the penis between the index and middle fingers of both hands, in order to bring the prepuce forwards, while the two thumbs are applied to the glans, so as to press it backwards. If this method be unsuccessful, the glans and prepuce should be compressed by means of a tight bandage, the effects of which are to be promoted at each application, by strongly pressing the parts with the fingers.

These means, however, are by no means always free from danger. If the paraphymosis be accompanied with severe inflammation, the use of leeches, the tepid bath, and emollient applications should always be preferred; and if these means, combined with other active antiphlogistic measures, do not afford a speedy and evident relief of the symptoms of the affection, no time should be lost in performing the operation for paraphymosis.

OPERATION FOR PARAPHYMOSIS.

In the operation for paraphymosis, the surgeon should separate the two swellings, as much as possible, so as to expose the constricted part, and then take a narrow bistoury, pass it under the stricture, and divide it by elevating the point of the instrument. In this manner the skin is to be divided in three or four different places, to the extent of from five to six lines. When this is done, it will be necessary, in order to facilitate the reduction and disgorge the parts, to scarify the prepuce in several places in the direction of the penis.

When the stricture is removed, the glans should be compressed between the fingers, so as to render it sufficiently small to allow the prepuce to be brought over it. Notwithstanding the severe pain which they occasion, these attempts should be continued until they have produced the desired effect, for, if this be neglected, much inconvenience must necessarily be the consequence. Finally, when the reduction is effected, nothing remains to be done but to keep the penis in an elevated position and bathe it several times a day with some emollient decoction.

There are sometimes cases, however, in which the reduction should not be attempted. This is the case, especially, on the one hand, when the paraphymosis is of very long stand-

ing, and has contracted adhesions between the glans and prepuce; and, on the other, when the swelling and inflammation are so severe, that the least attempt at reduction would be likely to be attended with disagreeable consequences. In this last case, antiphlogistic measures should always be previously employed, and the reduction deferred until the symptoms have considerably abated.

CANCER OF THE PENIS.

In cases of cancer of the penis, the removal of the diseased parts is the most effectual means that can possibly be employed; but, even this does not always protect the patient against a return of the disease. As a general rule, it may be stated here, that the operation should never be performed, when there remains less than an inch of the penis, when the lymphatic glands of the groin are in a state of induration, and when the patient labours under what is called a cancerous diathesis. Another important precaution, before performing the operation, is to ascertain whether the penis itself be in a truly cancerous condition, or whether the prepuce be alone affected; a circumstance which is not unfrequently found to be the case. In dubious cases, therefore, the glans should always be fairly brought into view by making an incision through the prepuce.

AMPUTATION OF THE PENIS.

Apparatus.—The apparatus which is required in the operation of amputating the penis, consists of a straight bistoury, with a long blade, or a small amputating knife, a gum-elastic catheter, a pair of dissecting forceps, ligatures, a few sponges, warm water, lint, compresses, and a bandage.

Operation.—The patient being placed upon his back, on the edge of the bed, the surgeon takes hold of the end of the penis with the left hand, near to where it is to be amputated, while an assistant grasps it near the pubes. When the skin is properly tightened, the penis is to be separated with one sweep of the bistoury directly from below upwards, at the distance of half an inch from the cancerous part. When the operation is to be performed very near to the pubes, it will be better to make a circular incision through the skin, about three or four lines above the place where the amputation is to be made, and then to cut off the penis on a level with the inferior part of the circular wound through the integuments.

As the penis, when amputated near the pubes, is always apt to retract under that bone within the integuments, so far that it is difficult to tie the arteries, it has been recommended by some surgeons, in order to obviate this inconvenience, to draw

the skin forwards and fix it with a piece of tape; and then make an incision just deep enough to divide the dorsal arteries, which are to be tied before the knife is again used. The incision is then to be continued, until the two arteries of the corpora cavernosa are cut. These are now to be tied; and the operation is then to be completed by dividing the corpus spongiosum and the rest of the skin of the penis.

When the amputation is finished in the usual way, the arteries should be secured with the ligature, the catheter introduced into the urethra, and the wound dressed as we shall presently direct.

Dressing.—The wound should be covered with finely scraped lint, which is to be supported with a perforated compress, and a T-bandage. The subsequent dressings are to be applied in the same manner as the first; and the catheter is to be kept in the bladder until the wound has completely cicatrized, in order to prevent the orifice of the urethra from becoming obstructed; care being taken to remove the instrument frequently for the purpose of cleaning it.

DOUBLE T-BANDAGE OF THE PELVIS.

The double T-bandage consists of a transverse roller, about four inches wide, and long enough to pass once or twice round the body above the hips, and of two perpendicular pieces, attached at one of their extremities at a right angle to the preceding.

Application.—The transverse roller is to be passed round the loins and held by an assistant, who is to bring it in contact with the two perpendicular pieces, corresponding to the posterior and middle part of the pelvis. The ends of the transverse roller are then to be pinned, while the two other pieces are to be carried towards the perineum, where they are to be crossed, and then directed obliquely upwards and outwards, in order to be secured to the roller which encircles the body. This roller may be prevented from slipping too far down by means of a scapulary.

SARCOCELE.

Cancer of the testicle, or sarcocele properly so called, like that of the penis, requires the removal of the diseased parts. Every other mode of treatment is attended with much inconvenience, and little benefit, especially when the affection is of long standing. The operation, however, is always contra-indicated when the scirrhus engorgement extends as far as the inguinal ring, when a portion of the tumour is contained in the abdomen, or when the patient is evidently labouring under a cancerous diathesis.

When the removal of the diseased parts is deemed necessary, no time should be wasted in the trial of means which can not be depended upon; but the operation should be immediately performed.

CASTRATION OR EXTIRPATION OF THE TESTICLE.

The best and most expeditious method of removing a diseased testicle, is that which has been proposed by Professor Dupuytren, and which is performed in the following manner. Previously to commencing the operation, the parts are to be well shaved, the patient is to be placed upon the edge of the bed, and his thighs are to be separated by two assistants. When the integuments are properly tightened, the surgeon takes a convex bistoury, and makes an incision through the scrotum, commencing at the upper part of the ring and extending as far as the lower part of the tumour; or, if the tumour be very large and the integuments covering it in a state of disease, it should be circumscribed with two curved incisions, so as to embrace the portion of the skin which it is designed to remove. The external pudendal arteries, which are always divided in this incision, should be immediately tied. The testicle being thus brought into view, should be dissected from its connexions with the scrotum, and completely detached, while an assistant holds the cord. In order to prevent hemorrhage, it will be necessary, before removing the testicle, to secure the spermatic arteries by means of a ligature passed around them with a curved needle, and with the view of preventing the retraction of the cord into the abdomen, the ends of the ligature, according to Professor Lisfranc, should be held by an assistant. The spermatic cord is then to be divided at the distance of about five or six lines below the ligature.

When the testicle, and every part of the diseased structure have been removed, all the arteries which require to be taken up, should be carefully tied with fine silk ligatures, the ends of which are afterwards to be united, wrapped in a piece of cloth, and placed in the upper angle of the wound.

Dressing.—Having finished the operation, the wound is to be covered with a fenestrated compress, a proper quantity of finely scraped lint, and a T-bandage. Care should also be taken to fill with lint the space which is comprised between the internal part of the thigh and scrotum. When the dressings are applied, the patient should be placed in the middle of the bed, his head and chest should be slightly elevated, and his thighs and legs flexed by means of a pillow.

HYDROCELE OF THE TUNICA VAGINALIS.

The treatment of hydrocele is either palliative or radical. The palliative treatment, which consists in opening the con-

taining bag in such a manner as to let out the water, is indicated when the infiltration is very large and of long standing, and is complicated with a scirrhus engorgement of the testicle, or the spermatic cord, with an old congenital hernia, or some chronic affection of the urinary passages; or when it supervenes at the close of a chronic disease, of which it appears to be critical, and especially when the patient is very old and enfeebled.

On the contrary, recourse should always be had to the radical treatment, whenever the hydrocele is simple, and the subject has a good constitution. The radical treatment consists in emptying the tumour, and in exciting such a degree of inflammation in the tunica vaginalis and the tunica albuginea, as shall lead to the production of adhesions between these two membranes, so as to obliterate the cavity in which the fluid is collected, and thereby prevent all farther accumulation. To accomplish this purpose, surgeons have devised several operations, the best of which are incision, excision, and injection. The choice of these operations must, of course, be determined by the kind of hydrocele. Incision is generally preferred when there is some doubt about the nature of the disease, or when the tumour is encysted; excision, when the hydrocele is of long standing, and the tunica vaginalis is thickened, indurated and ossified; and injection, whenever the disease is simple, and of short standing. Besides these means, wherewith a permanent cure is not unfrequently effected, surgeons have also recommended the application of blisters to the scrotum, with the view of promoting the absorption of the fluid; and this method is said to have sometimes been productive of benefit. When, in a case of hydrocele of long standing, the surgeon can not exactly ascertain the state of the testicle, or even when he entertains some doubt about the nature of the tumour, as it is impossible to decide, *a priori*, upon the best method of operating, it is necessary, according to the advice delivered by Professor Boyer, to have at hand, not only the apparatus that is necessary for making the incision and injection, but every thing that is required in cases of castration, in order that he may proceed immediately to this operation, if it should turn out to be a case of sarcocele, or hydro-sarcocele.

OPERATION FOR HYDROCELE.

A.—Incision.

The first step of the operation consists in making an incision through the integuments, as in the operation for castration, and in making an opening at the upper part of the containing bag, of such a size as to enable the surgeon to introduce his two fingers. A bistoury is then to be passed in, and the

incision is to be extended as far as the bottom of the tumour. When the fluid is evacuated, the cavity of the tunica vaginalis is to be carefully filled with fine lint, which is to be covered with compresses, and supported with a suspensory bandage. The lint in the cavity of the tunica vaginalis soon excites inflammation, which terminates in suppuration, and finally produces an adhesion between the two serous surfaces. If the swelling and inflammation be moderate, nothing more will be necessary than to cover the parts with an emollient poultice; if, on the contrary, they become severe, recourse should be had immediately to a very active antiphlogistic treatment. At each dressing, care should be taken to remove such lint as can be easily detached; in other respects the subsequent dressings are perfectly similar to the first, with the exception that the greatest care is to be taken to bring the lint every where in contact with the two layers of the tunica vaginalis, in order that there may be no cavity for the lodgement of matter or serum.

B.—Excision.

Making a longitudinal incision through the scrotum, at the anterior and middle part of the tumour, in the same manner as in the operation for castration, and so as to expose the containing bag, the surgeon separates it by cutting away the cellular tissue which connects it to the skin on either side, nearly as far as the place where the tunica vaginalis is reflected over the epididymis. When this dissection, which may frequently be made with the fingers, is completed, an incision is to be made from above downwards through the whole length of the tumour, and when it is perfectly emptied, its flaps are to be detached with the scissors, as near as possible to the spermatic cord and testicle. Under ordinary circumstances, the surgeon is obliged to tie the artery of the septum, which generally gives rise to a profuse hemorrhage.

When the operation is finished, the parts are to be dressed in the same manner as in the preceding operation.

A new mode of excision for the radical cure of hydrocele, has lately been proposed by Mr. Wood, which consists simply in puncturing the tumour with a common abscess lancet, drawing out a small portion of the sac by means of a tenaculum, and cutting it away. This plan, though perhaps the mildest that has yet been suggested for the cure of this complaint, requires more ample experience than we at present possess, to determine whether it is as certain as that by injection.—*Med. Chir. Trans.* vol. ix. p. 33.

C.—Tapping and Injection.

This method, which is extremely simple, easy of execution, and certain of producing adhesive inflammation in every part

of the tunica vaginalis, is the one which is at present most generally employed. Its effects are always more prompt and beneficial in proportion as the hydrocele is small and recent, because the tunica vaginalis may then be more easily brought into contact with the testicle. It should always be laid down, as a general rule, that the surgeon should operate as soon as the accumulation is sufficiently great to exclude the possibility of wounding the testicle with the trocar: another equally important precaution is, when the tumour is very large, to make a preliminary puncture, and to wait until the tumour has considerably subsided, in order to facilitate the retraction of the parietes of the bag. In cases of this description, however, the method of Baron Larrey should be preferred to that of injection, which, acting upon a very large surface, is always apt to produce some inflammatory symptoms.

Apparatus.—The apparatus essential for performing this operation, consists of a small trocar, a basin, a few compresses, a suspensory bag, and half a pint of Roussillon wine at the temperature of about 33° , in which is to be previously boiled one ounce of Provins roses.

Operation.—Tapping.—When every thing is ready, the patient is to be placed on the edge of the bed, and his thighs are to be separated by two assistants. The operator then lays hold of the back part of the tumour, so as to push the fluid forwards and keep the testicle upwards and backwards, while he takes the trocar in his right hand, and plunges it into the anterior and inferior part of the tumour, taking care to direct it a little obliquely from below upwards and from before backwards.* When the instrument has entered the cavity of the tunica vaginalis, which may always be known by the want of resistance, the operator takes the canula between the thumb and fore-finger of the left hand, and withdraws the perforator. As the water escapes, the canula should be gradually pushed upwards; and when it is completely evacuated, the surgeon is to proceed to the second step of the operation.

Injection.—Before the injection is thrown in, the operator should always carefully move the canula from side to side, in order to satisfy himself that its extremity is in the cavity of the tunica vaginalis. This precaution should never be neglected for fear of injecting the wine into the cellular tissue of the scrotum. Another no less important precaution, in cases of congenital hydrocele, is to compress the upper part of the tumour, in order to close, as exactly as possible, the inguinal canal and prevent the injection from passing into the cavity of the peritoneum. The operator then adapts the tube of the syringe to the canula, and pushes the injection in a slow, gra-

* In giving this advice, we suppose that the testicle is situated at the posterior and middle part of the bag; but, when this is not the case, the puncture is to be made at a place where there is no danger of wounding it.—The transparency of the tumour is generally such as to enable us to ascertain its situation.

dual, and continued manner, until the tumour has acquired its former dimensions; after which the instrument is to be withdrawn, with the precaution to apply the extremity of the index-finger upon the opening of the canula, so as to prevent the wine from passing out. The fluid is to be allowed to remain in the cavity of the tunica vaginalis for about three or four minutes, after which it is to be discharged through the canula. In this manner the operation may be immediately repeated, especially when the serous membrane is thickened and insensible, and the patient experiences little pain during the first injection. In cases of this description it may even be necessary to add a small quantity of brandy. After the first injection, however, the patient usually feels severe pain in the groin, and along the course of the spermatic cord: which symptoms are rather desirable, as they evince that the stimulus of the fluid is likely to produce the proper effect of exciting the necessary degree of inflammation. When the operation is finished, the canula is to be gently withdrawn, and the scrotum is to be covered with compresses wet with warm wine, and supported in a suspensory bag.

Treatment after the operation.—The wet compresses are to be continued for about three days after the operation, but, as the inflammation which generally supervenes about this time, is often extremely severe, the compresses should be laid aside, and emollient poultices applied in their stead, which are to be kept on until the symptoms have completely subsided.

Accidents.—It not unfrequently happens, after the operation for hydrocele, that the inflammation of the tunica vaginalis and of the adjacent parts is so severe as to give rise to the formation of matter in the cellular tissue of the scrotum. It is of the utmost importance, therefore, to subdue the inflammatory symptoms by the most active antiphlogistic measures, as soon as they assume the least intensity.—Another accident, which depends entirely upon the surgeon, is the infiltration of the fluid into the cellular tissue of the scrotum, when the extremity of the canula has slipped out of the cavity of the tunica vaginalis, which sometimes happens when the operator neglects pushing the instrument into the bag in proportion as it becomes emptied. When such an accident happens, it may be known chiefly by the difficulty which is experienced in passing the injection, and the impossibility of discharging the fluid. Under these circumstances no time should be lost, in order to prevent the formation of abscesses, sloughing, and other dangerous symptoms, to give vent to the extravasated fluid by means of one or two large incisions and the application of pressure. When the inflammation is very violent, recourse should be had to the use of general and local bleeding, fomentations, poultices, saline purges, and a bag for keeping up the scrotum.

D.—Method of Baron Larrey.

This method, which is nothing but an improvement of that of the elder Monro, possesses many advantages in cases of very large hydroceles, in which injections are always more or less dangerous. It consists in making a puncture through the scrotum, and introducing into the cavity of the tunica vaginalis, a small piece of an elastic-gum catheter, which is to be kept in the opening, in order to excite the necessary degree of inflammation and to give vent to any fluid that may afterwards accumulate.

*E.—SETON.**

The seton, which is at present still preferred by some of the English practitioners, especially by Sir Astley Cooper, was first mentioned as a means of curing hydrocele, by Guido di Cauliaco, in 1498. The operation, according to Sir Astley Cooper, is performed by passing a common curved needle and a ligature transversely through the hydrocele, about midway between the upper and lower part of the swelling, including about one inch and a half of integument, and one inch of the tunica vaginalis. The thread is then to be tied into a knot, and left loosely hanging in the tunica vaginalis and scrotum.

STRICTURES OF THE URETHRA.

The contraction of the urethra may be either temporary or permanent. In the first case, it is owing to a local congestion, or a spasmodic contraction of its parietes, and ceases either spontaneously, or by the employment of antiphlogistic or anodyne applications; in the second, it results either from an induration of the lining membrane of the urethra or of the subjacent tissues, from the presence of membraniform concretions, or from adhesions formed in consequence of a wound or an ulceration.

On the present occasion, however, we shall speak only of what are called organic or permanent strictures. Two methods of treatment are at present generally employed to restore the natural diameter of the urethra; one consists in gradually dilating the contracted part of the canal; and the other in destroying the obstacle by means of caustic.

DILATATION OF THE URETHRA.

This mode of treatment should always be put in practice when the stricture is recent, and appears to be owing to a

* By the translator.

chronic irritation and swelling of the mucous membrane, unaccompanied by induration. The gradual dilatation of the urethra may be effected, either by means of a hollow gum-elastic bougie, or a flexible catheter, containing a small leaden stylet; by a cat-gut bougie, as advised by Lallemand; or, when the stricture is not very large, by means of Dr. Beauclerc's hollow bougies, which are ingeniously surrounded with prepared sponge, and have, like the cat-gut bougies, the property of becoming expanded by moisture, without being attended, however, with the inconvenience of becoming too quickly softened.

The bougies which are most generally employed are made of wax or caoutchouc. But, whatever may be the materials of which they are composed, the surgeon should always commence with introducing the finest he can possibly get, and gradually those of a larger size, until he has accomplished the desired object.

Introduction of the bougie.—After the patient has emptied his bladder, the surgeon is to draw back the prepuce, and hold the penis between the thumb and fore-finger of his left hand, which are to be applied on each side of the corona glandis. When the bougie has been well oiled, it is to be held between the thumb and fingers of the other hand, and to be introduced into the meatus urinarius by gently turning it between the fingers. If the surgeon experience any resistance, it will be necessary, instead of attempting to push it farther, to draw the bougie a little back, and then attempt to pass it again. These attempts are to be steadily, but cautiously continued, until the resistance is completely overcome. Should they fail, however, the surgeon should endeavour to pass the bougie by pressing against the stricture with the fingers of the right hand; or, if the stricture be deeply seated, by introducing a finger into the rectum.

If, with all these precautions, however, the instrument can not be passed into the bladder, and there are no urgent symptoms for dilating the urethra, it will be best to adopt the advice delivered by Professor Dupuytren, which consists in introducing a very fine catheter, the extremity of which is to rest against the stricture. By this means the tissues will soon become softened, and the instrument will be enabled to pass. Another mode of enabling the instrument to pass, which has sometimes been employed with success, especially by Soemmering, is that of injecting olive oil, either alone, or combined with laudanum, and of forcing the fluid through the stricture by closing the external orifice of the urethra. This operation is to be repeated until the surgeon is able to pass a very delicate bougie or cat-gut.

The bougies should be introduced every morning and evening, and should never be kept in more than about half an hour at a time, except in case we adopt the method of Professor Dupuytren, to which we have just alluded. Another important precaution is never to pass the instrument into the bladder, but just beyond the stricture. When the patient has

once become accustomed to wearing the bougie, it may be kept in the urethra during the greatest part of the day; or, if it do not obstruct the passage of the urine, it may even be worn constantly; taking care, however, in this case, to change it at least every two days, in order to prevent it from becoming incrust-ed. The instrument is to be secured according to the method of Ducamp, which generally answers perfectly well, and consists in bending the bougie to a right angle with the meatus urinarius to the extent of about half an inch. The end of the penis, as well as that of the instrument, is then to be covered with a condom, which is to be secured by means of a gum-elastic ring, passed around the base of the penis.

After the stricture has become somewhat dilated, the common bougies are generally productive of so much pain that it will be necessary to discontinue them. Under these circumstances we may make use of the bougies or catheters of Ducamp, which have the advantage of acting only upon the contracted part of the urethra, while they do not produce any disagreeable distention in any other part. These bougies, which are made of gum-elastic, have a kind of bulb or rounded knob near their extremity, from two to five lines in length, and from two to four lines in diameter, while the rest of the instrument is not more than about two lines thick.—They are introduced in the same manner as the ordinary bougies, care being taken always to begin with the smallest.

CURE OF STRICTURES WITH ESCHAROTICS.

This method of treatment, which is at present most generally employed, should always be adopted when the strictures are numerous, large, hard, callous, and of long standing. It is performed in two different ways: the one, which was first recommended by Wiseman, and afterwards by John Hunter, is at present almost exclusively adopted in England, and consists in cauterizing the stricture from before backwards by means of the nitrate of silver; the other, which has recently been suggested, and successfully practised by M. Ducamp, and which is preferred by the French practitioners in the majority of cases of strictures owing to chronic alteration of the parietes of the urethra, consists in carrying the nitrate of silver into the interior of the stricture, and in destroying it from the centre towards the circumference. The method of Ducamp deserves a decided preference, inasmuch as it is more efficacious and exempt from most of the inconveniences with which the other is attended.

A.—Method of Ducamp, modified.

The operation of Ducamp may be divided into three stages, each of which is calculated to fulfil an important indication.

In the first, the bougie is to be introduced, so as to ascertain, with as much exactness as possible, the situation, form, extent and number of the strictures; in the second, the stricture is to be carefully destroyed; and in the third, the urethra is to be permanently dilated, so as to effect a complete cure.

1. *Examination of the stricture.*—This examination is accomplished by means of a hollow gum-elastic bougie,* the anterior opening of which is only half as large as the other. Having carefully ascertained the number of figures on the bougie, the surgeon takes a small piece of sewing silk, ties it into several knots, and dips it in melted wax. The silk is then to be rolled into an elongated ball, which is to be introduced into the larger opening of the bougie and conveyed as far as the other orifice by means of a thread previously attached to it. When arrived there, the ball which is thus formed by the wax adhering to the knots, is prevented from passing through, while the silk projects, so as to form a very soft, strong pencil. This pencil is then to be dipped in a mixture of equal parts of yellow wax, diachylon, shoemaker's wax and resin. As soon as this composition begins to cool, it should be softened between the fingers, and rolled upon a polished surface, in order to give it the form and size of the bougie. This projecting part is then to be cut off at the distance of about two lines from the instrument, and slightly rounded.

The bougie is then to be conveyed into the urethra, and when it has arrived at the stricture, it is to be left there for a short time, in order that the mixture may become softened; after which it is to be pushed on in a gentle and continued manner. The wax being thus pressed between the bougie and the stricture, is moulded upon the latter, so as to assume its exact shape. If the piece of wax which has entered the stricture be bent into a mass, there will be a necessity of cauterizing the whole circumference of the urethra; if the wax, on the contrary, be bent to one side, the surgeon may be certain that the obstruction is on the opposite.

In this examination, it is of the utmost importance to measure the distance of the stricture from the external orifice, in order that the caustic may be in no danger of touching any of the sound parts. This desirable object, however, can not always be accomplished; for it is well known that the marks on the bougie can not always be depended upon, because, on the one hand, the length of the wax is subject to variation, and, on the other, when we take the form of a stricture, the bougie is almost invariably bent, in consequence of which the surgeon is apt to be deceived with regard to the depth at which the obstruction is situated. In order to obviate the first of these inconveniences of the method of Ducamp, M. Lallemand has proposed to apply a *porte-caustic* along the bougie

* No. 8 or 9 is the best size.

with which the distance and shape of the stricture have been measured, so as to begin at the deformity of the wax, and proportion the distance between this point and the figure, which denotes the depth of the stricture. M. Lallemand is also in the habit of introducing large gum-elastic bougies, so as entirely to fill up the canal of the urethra, and thereby obviate the inconveniences which are apt to result from the use of very small flexible instruments.

Having ascertained the thickness and situation of the stricture, the next thing to be done is to measure the extent of the obstruction from before backwards. For this purpose the surgeon takes a few silk threads, dips them in melted wax, and winds them around a very slender gum-elastic bougie, the extremity of which is to be rounded and finely polished. When this bougie, thus prepared, is passed beyond the stricture, and retained there for a few moments with a moderate degree of pressure, the wax will become softened, and be marked with a depression, the length of which will be equal to that of the obstruction.

When the orifice of the stricture, although perfectly central, can not be readily passed by a bougie proportioned to its diameter, the point of the instrument may be guided by means of a director, which is nothing else than a gum-elastic catheter, marked No. 8 or 9, about eight inches in length, and open at both ends. This director is to be carried as far as the stricture, the opening of which is to correspond to the centre of that of the instrument, so as to enable the bougie to pass without difficulty. If, on the contrary, the orifice of the stricture be situated superiorly or inferiorly, or on either side of the urethra, the impossibility of introducing the bougie obliges the surgeon to use another director, which differs from the preceding in having a lateral eminence at its anterior extremity. This eminence is intended to direct the opening of the instrument towards the orifice of the obstruction; for which purpose it will be sufficient to turn it upwards, when the stricture is on the lower part of the urethra, and vice versâ. By this contrivance, the orifice of the instrument will be brought against that of the stricture, and if the bougie be now introduced, its extremity will readily pass through the opening in the director, into that of the obstruction. This instrument, however, can only be employed in cases of strictures of the free portion of the urethra. When introduced to the extent of more than six inches, it becomes extremely difficult, according to M. Lallemand, to give the proper direction to its extremity, on account of the facility with which it is turned upwards when it arrives in the bulb of the urethra.

II. *Cauterization.*—After having acquired all the necessary information with respect to the situation, form, and extent of the stricture, the surgeon proceeds to the application of the caustic in such a way as not to injure any of the sound parts, either before or behind the obstruction. To accomplish this

object, Ducamp has invented an ingenious instrument called the porte-caustic. The serious inconveniences of this instrument, however, have induced practitioners to modify it in various ways; but the most important are those of M. Lallemand.

The cauterizing catheter, or porte-caustic of M. Lallemand, consists, first, of a platina tube open at both extremities, and calculated to protect the nitrate of silver; secondly, of a stylet of the same metal seven lines longer than the catheter, charged with the caustic, and closing the vesical extremity by means of an oval button; thirdly, of a nut secured to the other end of the stylet, to prevent it from leaving the tube, projecting one or two lines beyond the tube, so as to afford a better hold of the stylet, and moveable towards or from the catheter, according to the extent of the proposed cauterization; and fourthly, of a slider furnished with a screw, to indicate the depth to which the instrument penetrates. The porte-caustic should always be straight, if the stricture be situated in front of the arch of the pubes; curved, if it be situated beyond it.

After having dilated the stricture by means of a common, or cat-gut bougie, so that the catheter may be enabled to pass through it, the stylet is charged with the nitrate of silver,* and introduced into the catheter. This instrument is then oiled and passed upon the stricture; and the slider is brought into contact with the glans penis. When the situation of the stricture has been thus ascertained, the slider is to be fixed at the point exceeding that which indicates the depth of the obstacle by a space equal to its length, which has been previously ascertained. If, for instance, the stricture be six lines in length, the slider should be fastened six lines from the glans; at the same time that the nut of the stylet is arrested at the distance of six lines at the other extremity of the instrument. The catheter is then passed in until the slider touches the glans, and as soon as the surgeon is convinced that it has entered the stricture, he is to take hold of the outer end of the stylet with one hand, while with the other he draws back the catheter as far as the nut, so as to lay bare the caustic. The parts may now be readily cauterized by turning the instrument between the fingers, taking care to leave between the glans and the slider, the same distance that the catheter has passed, which denotes the length of the stricture. If, in rotating the catheter, that part which contains the caustic should meet with considerable resistance from irregularities, it should be applied longest in that direction. After the expiration of

* This is done by filling the cavity of this instrument with a few small pieces of the nitrate of silver, which is then to be melted by applying the flame of a lamp by means of a blow-pipe, and as soon as it is sufficiently heated, it should be spread evenly over the surface of the instrument: if there be any asperities, they should be reduced by means of a pumice stone, or by any other similar method.

about a minute, the stylet is to be drawn back into the catheter, and the instrument is to be removed.

This operation is to be repeated in about three days, at which time the slough usually separates; but before the surgeon proceeds to measure the stricture, he should introduce a bougie to ascertain whether there be any obstruction further back. In this manner the operation is to be repeated as often as the circumstances of the case may indicate, taking care gradually to increase the diameter of the catheter, until we are enabled to introduce one of the sixth size. By this means we may cauterize several strictures a day, which can not be done with the instrument of Ducamp.

Whatever may be the length of the stricture, M. Lallemand asserts, that it may always be cauterized in its whole extent, without the least fear of producing violent inflammation. This practitioner, in fact, has in this manner destroyed the largest kinds of stricture without any inconvenience whatever. It sometimes happens after this operation, that the eschars, in becoming detached, obstruct the urethra and give rise to a retention of urine. When this is found to be the case, the accident may be remedied by the introduction of the catheter.

After having destroyed the stricture, it is sometimes necessary, in order to preserve the proper diameter of the canal of the urethra, to continue dilating the parts. This is the case, especially, when the obstruction is in the neighbourhood of the meatus urinarius and results from the cicatrization of the ulcerations or fissures which have been made by the beak of the catheter, or by the cauterization of the healthy parts, as is often found to be the case when the caustic is carried from before backwards according to the old method. The necessity of dilating the urethra is indicated by the progressive diminution of the jet of urine; but it should never be done so long as there is the least irritation from the effects of the caustic.

B.—Method of Mr. Hunter.

This method, although generally subject to serious inconveniences, is always preferable to that of Ducamp in cases of membraniform strictures. It consists in destroying the obstruction from before backwards by means of a bougie, armed with a piece of the nitrate of silver. Before introducing this instrument, the surgeon passes a common bougie, nearly the size of the canal, down to the stricture, to ascertain its exact situation, and make the canal of the urethra as open as possible. The distance is then to be marked upon the armed bougie, which is to be oiled, and passed down upon the stricture, where it is to be retained for about one minute, with a slight degree of pressure. This operation is to be repeated every two or three days, until the patient is perfectly relieved.

CURE OF STRICTURES BY INCISION.

This method, which is preferable to that of cauterization, when the stricture is situated at the meatus urinarius or in the fossa navicularis, consists in introducing a straight bistoury, with a narrow blade and a blunt point, taking care to rest the back of the instrument against the side oppositely to the one where the obstruction is seated, and then divide it through its whole extent by a single stroke of the knife. The edges of the wound are then to be slightly cauterized, and the urethra is to be kept dilated with a large bougie. The incision should extend no farther than through the parts which form the stricture. It is necessary, therefore, on the one hand, to ascertain precisely the extent of the hindrance in the manner we have already mentioned, and, on the other, to arrest the progress of the instrument, as soon as the surgeon perceives that the resistance offered by the tissues, which form the stricture, ceases.

II.—Diseases of the Sexual Organs of the Female.

REVERSION OF THE VAGINA.

When the disease is recent, and consists merely in a slight relaxation of the mucous membrane, it may generally be removed by tonic and astringent injections, and cold washes. When, however, it is of long standing, and the tumour is so large as to project through the vulva, it will be necessary, in order to effect a reduction, to place the patient in the same position as in the operation for the taxis, and push the parts back with the extremity of the fingers. Should the reduction be attended with much difficulty, it will be necessary to facilitate the operation by emollient or astringent applications, and a recumbent posture. After the parts have been restored to their natural situation, they must be kept up by supporting the parietes of the vagina by means of a soft sponge, which is to be daily cleansed and renewed, or, what is still better, by means of a pessary.

PROLAPSUS UTERI.

When there is merely a slight descent of the uterus, it will generally be sufficient, in order to effect a reduction, to place the patient on her back, to elevate the pelvis somewhat higher than her chest, and to push the organ gently from below upwards with the index-finger. When, however, there is a complete prolapsus, the reduction is always attended with more difficulty, especially if the disease be of long standing, and

the displaced parts are tumefied and indurated. In these cases it is not only necessary that the patient should be placed in the same posture as in the former case, but the size of the parts should be previously diminished by fomentations, aided, if necessary, by a low diet, venesection, and the use of the warm bath, in order to produce a favourable relaxation.—When the prolapsus occurs during the early stage of pregnancy, the practitioner should by no means neglect to reduce the part. In cases of this description, the operation is to be facilitated by emptying the rectum and bladder; and when the organ is reduced, the patient should be kept for some time in a recumbent posture, and every thing should be avoided that may have a tendency to reproduce this unpleasant accident. When the pregnancy is very far advanced, it will be necessary, as it is then impossible to replace the uterus, to keep it well supported with a suitable bandage, and put the patient in a recumbent posture, until the period of delivery.

When a prolapsus uteri takes place during labour, every attempt at reduction will be both useless and dangerous. In this case, the delivery should be expedited by gradually dilating the os tincæ; and when the fœtus is expelled, the placenta should be extracted by introducing the hand, so as to separate it gradually from the edges towards its centre. The surgeon should then proceed to the reduction of the organ, which may now be done with much more facility, on account of the diminution of the size of the contracted uterus.

After the uterus has been reduced to its natural situation, the next indication is to prevent another displacement. For this purpose it will frequently be sufficient, especially when the disease is not of a very serious nature, to confine the patient in a recumbent posture, and make use of cold astringent injections. In cases of an opposite character, however, it will be necessary to have recourse to the use of pessaries; but these should never be employed so long as there is the least pain and inflammation of the parts.

Pessaries.—The pessaries which are most generally employed at the present day, are made of caoutchouc, and vary in size according to the state of the parts. When the vagina is narrow, the pessary should be round, and have thick edges; but, in cases of an opposite description, it should be either oval or in the form of a figure of 8, the latter of which is particularly well calculated for the purpose, since it does not compress either the bladder or the rectum, which the round and large-sized pessaries are always apt to do. Professor J. Cloquet has lately invented a new pessary, to which he has applied the epithet of *elythroid*, from its resemblance to the vagina, the cavity of which it exactly fills. These pessaries are made of different sizes, and besides fulfilling every necessary indication, they have none of the inconveniences of those to which we have just alluded. Whatever pessaries are used, however, let it always be remembered, that they should be so large

as not to enter the vagina with too much ease, and that the opening in the centre of the instrument should never be so capacious as to admit the cervix uteri.

Application.—In applying a pessary, care should be taken that the woman's bowels shall have been freely opened, and her urine passed; and also that she shall have kept her bed for an hour or two previously to the introduction of the instrument. She must then be placed near the edge of the bed, with her pelvis slightly elevated, and her thighs separated, while the surgeon takes the pessary, previously oiled, and presses it gently against the os externum, by directing the force downwards towards the internal face of the perineum, and backwards in the direction of the vagina, in such a manner as shall make the introduced edge look towards one of the sacro-iliac symphyses. When the whole of the instrument is received into the vagina, the surgeon must give it a transverse direction, in order that its two extremities shall rest against the tuberosities of the ischii, and that its two surfaces shall be directed, the one towards the uterus, and the other towards the vulva. In introducing the cup or pivot pessary, the concavity is to be directed upwards, and the pivot is to be retained by means of a piece of tape secured to a proper bandage. If the pivot, however, be very short, we may adopt the advice of Professor Désormeaux, and leave it in the vagina without any apprehension of danger. With respect to the elythroid pessary of Professor Cloquet, its concave surface is to look towards the vagina, and its convex towards the left thigh of the woman. In this manner it is to be introduced in the vagina, and when its lower edge has passed the orifice of this passage, the surgeon introduces the index finger of the right hand into its cavity, while, with the index finger of the left hand, it is to be turned in such a manner that its concave surface shall look forwards, and the other backwards. When it is applied, the patient should be requested to stand up, cough, or walk about, and if it appears to be properly adjusted, she should be confined for a few days in a recumbent posture.

It usually happens that the pessary occasions a more or less profuse discharge from the vagina, and sometimes also a considerable degree of irritation. These inconveniences may be readily remedied by frequent injections of tepid water, and by removing the instrument about once every eight days, in order to wash it or substitute a new one.

RETROVERSIO UTERI.

When the retroversion of the uterus happens during labour, and consists merely in a slight depression of the fundus of the organ, it will be necessary, in order to remedy it, to excite the uterus to contract by gently pressing upon the anterior part of the abdomen, and make no attempt at extracting the placenta.

By this simple manœuvre, the depression may frequently be made to disappear. But if, on the contrary, the retroversion augments, the hand should be immediately introduced into the uterus, in order to elevate the depressed part and keep it up for a few moments, and if the placenta still adhere, we should wait for its spontaneous expulsion, unless circumstances of an opposite nature demand its speedy separation.

When the retroversion is so great that the uterus forms a large tumour on the outside of the vulva, the reduction will be more difficult. In this case the patient is to be placed on her back, with her pelvis raised somewhat higher than her chest, while the surgeon returns the whole of the uterus into the vagina, and then taking hold of the tumour with the right hand in such a manner that the palm shall be applied upon its middle, and the fingers around its base, he replaces in a slow and steady manner, first, the part which is next the orifice of the uterus, and successively, the rest of the organ. Another way of reducing the uterus, is to apply the end of the fingers to the centre of the tumour, in order to depress it until the parts and even the hand itself shall have completely passed through the os tincæ. During this operation, as well as during the other, care should be taken to steady the uterus by means of the left hand placed upon the hypogastric region, in order to render the reduction more certain and less painful.

After the reduction is effected, the right hand should be kept for a short time in the uterus, in order to support its parietes, and excite them to contract by means of slight titillations. If this, however, be not sufficient, and the uterus remains soft and dilated, we should endeavour to make it contract, by injecting cold vinegar and water, or by the exhibition of the *secale cornutum*, the efficacy of which, in cases of *inertia uteri*, has recently been fully proved by the experiments of Doctor Goupil. Should these means succeed, the patient is to be confined in bed, her bowels are to be kept open, and she is to be advised to avoid all kinds of exertion.

When the tumour is irreducible, all that can be done, on the one hand, is to support it by means of a pessary, if it be still in the vagina, or with a suspensory bag, if it hang between the thighs, and, on the other, to prevent all painful engorgement and excoriation, by washing the parts frequently with tepid water, and protecting them from the contact of foreign substances. If, however, by these means, and the employment of emollient applications, the tumour appears to become more soft and small, the surgeon should by all means endeavour to attempt its reduction by repeated efforts.—The uterus has been successfully removed, although unintentionally, by midwives and careless surgeons, who believed it to be a *polypus*; and the operation has also been three or four times performed methodically, and with a view to relieve the patient of an incurable infirmity. This operation, which has already

a number of partisans, has not yet been generally adopted, though from the trifling danger with which it is usually accompanied, the practitioner should never hesitate to attempt it. It consists in tying the neck of the retroverted uterus with one or two ligatures, which are to be tightened with Sauter's tourniquet, and in amputating it either immediately, or, what is still better, in a few days, at the distance of a few lines below the ligature. After the separation of the tumour, the remaining parts generally re-ascend into the cavity of the pelvis, and heal without difficulty.

POLYPI OF THE UTERUS.

Of the different operations, which have been recommended by authors for the removal of these tumours, two only are at present employed by practitioners. They consist in cutting away the tumour with a bistoury, or a pair of scissors, or in removing it with a ligature.

Excision is preferred when the polypus is fibrous, is supported by a narrow, ligamentous peduncle, and is so long that it may be reached and carefully examined with the fingers, in order to ascertain whether it contain any large vessels, which, when injured, would be likely to give rise to serious hemorrhage. For, when this is found to be the case, the application of the ligature will always be more safe. Excision is also preferable when the polypus has acquired such a size that the ligature can not be applied with any prospect of success, or when it has contracted adhesions with the vagina.

The ligature, however, is now most generally employed, and has the advantage of being applicable to most cases of polypi.

Neither of these operations should be performed so long as the polypus remains entirely in the cavity of the uterus. In this case, we should always wait until it has passed through the os tinæ, unless its presence give rise to such a degree of hemorrhage as to endanger the life of the patient; in which circumstance the operation is to be immediately performed, by artificially dilating the os tinæ. The most favourable time for removing a uterine polypus, is immediately after menstruation, or a profuse discharge of blood, because the genital organs are then more relaxed, and there is less danger of hemorrhage during the operation.

EXTIRPATION OF UTERINE POLYPI, BY MEANS OF THE LIGATURE.

According to the Method of Desault.

Apparatus.—The apparatus which is required in this operation, consists, 1. Of two porte-nœuds, which are nothing

else than two elastic slender forceps, contained in a silver canula. 2. One or two serre-nœuds, of a length proportioned to the size of the polypus. 3. Several ligatures, about two feet long, and passed through the ring which is formed by the approximation of the blades of the forceps.

Position of the patient.—In this, as in all other operations about the genital organs, the patient is to be placed across the edge of the bed, her head and chest are to be elevated, and her legs and feet are to be well supported by assistants.

Operation.—The surgeon standing between the legs of the patient, introduces two or three fingers of the left hand, previously oiled, along the posterior wall of the vagina, and carries them as far as the upper part of the peduncle of the polypus. He then shuts the two porte-nœuds, and taking them in his other hand, he passes them into the vagina. When these instruments have arrived at the neck of the tumour, the surgeon withdraws his fingers, and taking a porte-nœud into each hand, he makes them describe a semi-circle round the tumour from behind forwards, and then crosses them by changing the position of his hands. An assistant then opens the two forceps by pushing at their handles, in order that they may drop the ligature. The two instruments having now become useless, are to be withdrawn with the right hand, while the first two fingers of the other are to be carried upon the ligature, the loop of which embraces the neck of the polypus, so as to prevent it from becoming displaced. In order to tie the neck of the tumour, the two ends of the ligature are to be introduced into the ring of the serre-nœud, and the instrument is then to be carried up as far as the posterior part of the polypus, by pulling at the ends of the ligature. When the necessary constriction is made, the ligature is to be passed through the notch at the outer extremity of the serre-nœud, and twisted round the instrument.

It sometimes happens that the polypus is so large that it is impossible to introduce any instrument into the vagina. When this is found to be the case, it will be proper to follow the advice of Herbiniaux, which is to draw the tumour through the vulva, with a pair of small midwifery forceps, or the polypus-forceps of Museux, at the risk of producing an inversion of the uterus, and to apply the ligature upon its peduncle which is thus brought into view. In this case, however, it will be advisable to cut away the tumour immediately after the application of the ligature, in the manner we shall presently point out.

Care should always be taken never to draw the ligature too tight in the first instance, but to draw it gradually as it becomes relaxed. For this purpose the ligature is to be unfastened from the notched end of the serre-nœud, and drawn farther out, so as to increase the constriction; after which it is to be again passed through the notch and twisted.

When the peduncle of the tumour is very resisting on ac-

count of its size or ligamentous nature, this method of constriction will seldom be sufficient, and it will then become necessary to have recourse to Roderic's instrument, as improved by Sauter, or to Mayor's tourniquet.

When the adherent part of the polypus is very large, a simple ligature will scarcely ever be capable of producing a sufficiently speedy division. In this case, therefore, it will be necessary to pass a needle, armed with a double ligature, through the middle of the neck of the tumour, and after having tied the two ends of each ligature on each side of the polypus, to pass them through a *serre-nœud* or a particular constrictor, and thus divide the parts on either side from the centre towards the circumference.

Treatment after the operation.—After the operation is finished, the patient is to be confined in bed, make use of a low diet, and ease the pain and inflammation of the parts by frequent injections of some emollient decoctions. If, on the contrary, the parts are in a state of relaxation, and there is a very fetid discharge, as it is frequently found to be the case, it will be advisable to make use of aromatic injections, or of a solution of the chloride of soda. It need scarcely be observed, that if the ligature should give rise either to inflammation of the uterus or the peritoneum, or to other serious symptoms, it is to be immediately loosened, or entirely removed, and the patient is to be treated according to the circumstances of her case.

When the tumour is detached, and does not come away spontaneously, it should be extracted as soon as possible, either with the fingers, with a pair of Museux's forceps, or with an instrument resembling Smellie's midwifery forceps, which is to be introduced in the ordinary way, and the polypus taken hold of, and gradually drawn through the vagina.

EXCISION OF UTERINE POLYPI.

According to the method of Professor Dupuytren.

Having placed the patient upon her back, as already directed in one of the preceding paragraphs, and destroyed the adhesions of the tumour, either with the fingers, or a pair of long, curved, blunt-pointed scissors, "the surgeon lays hold of the polypus with Museux's strong forceps, and brings it as far as the orifice of the vulva, through which it is then to be made to pass, whatever may be its size, even at the risk of lacerating the external parts of generation. As soon as its peduncle is fairly brought into view, nothing remains to be done but to cut away the parts, either with the bistoury, or the scissors to which we have already alluded. If, however, it be found upon examination that it contains large vessels, it is obvious that the polypus must not be separated from its peduncle until after

the application of a strong ligature, so as to prevent every possible danger of hemorrhage. A case of this description, however, has never fallen under the notice of Professor Dupuytren. After this operation, which is usually attended with little pain, is finished, the uterus resumes its former place; the effusion of blood, which is commonly moderate, ceases spontaneously; all the pain speedily subsides, and the parts are healed in a very few days."—*Méd. Op. de Sabatier, édition Sanson et Begin.*

A method similar to the one just mentioned, has lately been practised by Siebold and Mayer, of Berlin, who consider it preferable to the ligature in all cases in which the peduncle of the polypus does not appear to contain any large vessels.

POLYPI OF THE VAGINA.

The treatment of polypi of the vagina is perfectly similar to that of polypi of the uterus of which we have just spoken.

CANCER OF THE UTERUS.

The surgical treatment of this dreadful affection consists in excising every part of the organ that is in a state of disorganization, or in destroying it with the potential cautery. So long, however, as the parts are merely in a scirrhus state, the ordinary constitutional remedies, which are usually employed in cases of this description, should always be preferred. But, if these remedies have been employed to no purpose, and the affection has passed from the scirrhus state to that of an ulcerated cancer, the removal of the diseased parts is the only thing that can afford the least prospect of success. The operation, however, should only be performed in those cases in which the cancerous disorganization is confined to the neck, or a portion of the body of the uterus. It is impracticable when the disease has invaded the greatest part of this organ, or has extended to its appendages. Some excellent practitioners, however, have advised and even performed the operation of excising the uterus while it was still contained in the pelvis; but, though experience has proved that the operation is usually attended with little difficulty, it is scarcely ever accompanied with sufficient success to warrant us in undertaking it. We shall, therefore, omit speaking of it on the present occasion, and wait until experience has determined its utility.

Although excision and cauterization are not always capable of arresting the progress of a cancer of a part of the uterus, the number of cures, and the trifling danger with which these operations are usually attended, are sufficient to warrant us in undertaking them. When the disease is developed in a young female, is of short standing, and confined to the cervix uteri, and when it is easy to ascertain its extent and cut

through the healthy tissues, excision is not unfrequently capable of effecting a cure, unaided by the employment of other means: the truth of this assertion has recently been confirmed by several successful cases in Paris. As a general rule, however, it is necessary to aid the cicatrization of the parts by the application of caustic; but this remedy should never be employed alone, except in those cases in which the tissues are so much disorganized that they become lacerated under the instrument which is used for steadying the parts, or when the unhappy sufferer refuses to submit to the operation of excision.

EXCISION OF THE CERVIX UTERI.

Previously to commencing the operation, care should be taken to empty the bladder and rectum, and to place the patient upon her back, as directed in speaking of the application of the ligature in cases of uterine polypi. The surgeon then separates the labia with the thumb, the index and middle fingers of the left hand, while with the other he takes a common speculum uteri, previously oiled and warmed, and passes it gently into the vagina, until its extremity comes in contact with the cervix uteri. The speculum is now to be given to an assistant, while the surgeon lays hold of all the cancerous portion of the neck of the uterus, with Museux's forceps, held in the left hand, and cuts it away with a pair of strong curved scissors, the blades of which are to be carried through the healthy tissues, at the distance of a few lines from the seat of the disease. In case the surgeon does not wish to use the speculum uteri, he may introduce the forceps by means of the left index finger placed in the vagina, and after having laid hold of the neck of the uterus, they may be drawn through the orifice of the vulva and kept there during the operation. Professor Récamier recommends cutting away the parts layer after layer, and always in a circular direction, in such a manner that the remaining part of the neck shall present a conical cavity. By this method the surgeon has it always in his power to remove the whole of the diseased structure, since the cavity of the cervix uteri is generally more disorganized than its external surface. In order to render this operation more expeditious, more easy and less painful, M. Hatin has invented an instrument, called the *uterotomus*, which seems to answer perfectly well in cases where the disease is confined to the neck of the uterus.

When the excision is finished, the surgeon should immediately proceed to arrest the hemorrhage, which is generally trifling, or at all events so inconsiderable that it may be easily checked by plugging the vagina, or cauterizing the orifices of the divided vessels. In performing the latter operation, it is absolutely necessary to use a speculum, which enables us

to cleanse the wound, and see the extremities of the bleeding vessels.

The operation of plugging the vagina may be done in different ways. If the hemorrhage be slight, it may generally be checked by the introduction of a number of dossils of lint, which are to be carried upon the wound with a pair of dressing forceps, taking care that they be previously attached to a ligature, which is to be left hanging through the vulva; or they may be enclosed in a piece of fine cloth, previously introduced through the centre of the vagina. If the hemorrhage, however, be profuse, the lint should be rolled in the powder of colophony, and be firmly applied to the wound by means of a pivot pessary, which is to be secured by the vertical pieces of a double T-bandage. In a case of this description, which came under the notice of Professor Récamier, and where no pessary was at hand, this gentleman successfully employed a small conical tumbler, filled with lint. In order to clean the wound, and apply the lint with greater prospect of success, it is always necessary to use a speculum, which should afterwards be withdrawn, and a pessary substituted in its place. The pressure of the lint may also be increased, as has been suggested by Professor Récamier, by placing a pillow upon the hypogastric region, and securing it by the transverse pieces of the T-bandage.

If, after the operation is completed, there be a return of the disease, or if it be found that the disorganized parts have not been entirely removed, no time should be lost in preventing the extension of the mischief to the adjacent parts, by the use of caustic applications.

CAUTERIZATION OF THE CERVIX UTERI.

The patient being placed as in the preceding operation, the surgeon is to introduce a common speculum, which is to be so constructed as to enable him to perceive the parts which are designed to be cauterized, and to protect the others from the action of the caustic. When the diseased surface is fairly brought into view, and is carefully circumscribed by the edges of the orifice of the instrument, it is to be cleaned with dossils of dry lint, which are to be carried up with a pair of long curved forceps, and if there be any fungous excrescences, they are then to be removed with the scissors, or a concave bistoury, and cauterized. For this purpose Professor Dupuytren generally uses a piece of pure potash, cut into a cone, and placed in a porte-crayon. M. Récamier, however, and most other practitioners prefer the nitrate of mercury, dissolved in nitric acid. This solution may be applied by means of a piece of lint, which is to be dipped in it, and then carried upon the parts with a pair of curved forceps. The action of this liquid caustic should be concentrated upon the affected

part, by placing the patient in such a manner that this part shall be in the most dependent situation; and in order to prevent the liquid from coming into contact with the parietes of the vagina, care should be taken that the edge of the speculum rest firmly against the parts which it embraces. After the cauterization is finished, the parts are to be carefully washed by means of one or two injections of tepid water, and the speculum is to be withdrawn. The patient is then to be confined in bed, and requested to make use of a low diet, in order to prevent the development of inflammation. Should this, however, take place, it is to be combated by the usual antiphlogistic means. When no unpleasant symptoms supervene, the operation should be repeated in about seven or eight days, and afterwards as often as may be necessary.

It sometimes happens that the application of the caustic is followed by severe pain, without there being any manifest inflammation to which it can be attributed. In this case, as well as in that in which the disease has arrived at such a degree that nothing can be done but to diminish the sufferings of the patient, great benefit may be derived by frequently applying dossils of lint upon the ulcerated surface, dipped in a mixture of mel rosæ and Rousseau's opium, as recommended by Professor Récamier.

Diseases of the Urinary Passages.

RETENTION OF URINE.

Although retention of urine is merely a symptomatic affection, yet it always demands prompt assistance; since it is well known, that if the bladder remain preternaturally distended, it not only loses its contractile power, but is quickly attacked with inflammation and sloughing.

Retention of urine may be owing to a great variety of causes, such as paralysis of the bladder; inflammation of its neck; strictures of the urethra; the pressure made on it by foreign bodies; enlargement of the prostate gland; and a great number of other circumstances.

In speaking of this affection, we shall divide it into the complete and incomplete forms; a distinction which will at once enable the surgeon to guard against a variety of errors.

The two principal means which are employed for the purpose of evacuating the urine from the bladder, consist in puncturing this organ, and in introducing the catheter. This last operation, however, is the one which is most frequently indicated, and should always be preferred, unless there be an insurmountable obstacle in the urethra; in which circumstance recourse must always be had to the first.

PUNCTURE OF THE BLADDER.

The operation which is most generally resorted to in the present day, consists in opening the bladder by plunging a curved trocar through the integuments above the pubes.

For this purpose the patient is to be placed upon the edge of the bed, and his thighs are to be gently flexed. The surgeon then takes a curved trocar, about four inches and a half in length, and representing the segment of a circle from seven to eight inches in diameter, and plunges it into the linea alba, about one inch above the pubes, in a direction obliquely downwards and backwards, so as to correspond with the axis of the bladder. As soon as the instrument has arrived in the cavity of the organ, which may always be known by the want of resistance, and the escape of a few drops of urine, it should be withdrawn. In proportion as the bladder becomes emptied, the canula should be gradually pushed in, so that it may not escape from the organ, and the discharge of the fluid should be promoted by requesting the patient to lie upon his side. When the evacuation is completed, the mouth of the canula is to be closed with a linen plug, and the instrument is to be secured with two pieces of tape, passed through the holes in its rim and carried round the pelvis. The plug is to be removed about once every hour, to facilitate the discharge of the urine, and in about seven or eight days the canula is to be replaced by a gum-elastic catheter. This is to be removed about once every week, in order to prevent it from becoming incrustated with urine; and as soon as the passage of the canal of the urethra is re-established, it is to be discontinued.

In order to prevent the infiltration of urine, which sometimes happens in this operation, when the canula accidentally escapes from the wound, Mr. Abernethy has proposed making an incision, three inches in length, between the pyramidales muscles, and to pass the fingers along the upper part of the symphysis pubis, so as to touch the bladder, and introduce a common trocar, of a middle size, in a direction obliquely downwards. This method possesses many advantages in cases of very corpulent persons.—For a more full account of the details of paracentesis, see page 280.

Puncture from the rectum.—The puncture from the rectum is extremely simple, and is always indicated when there is an insurmountable obstacle to the opening of the bladder above the pubes.

The patient being placed in the same position as that for lithotomy, the surgeon introduces the index finger of the left hand into the rectum and carries it as far as the most projecting part of the swelling of the distended bladder. A curved trocar*

* The curve of the instrument should form the segment of a circle of five inches in diameter.

is then to be carried upon the finger to the place just mentioned, and as soon as it has arrived at the distance of about nine lines behind the prostate, in the centre of the triangular space which is bounded on each side by the vasa deferentia, and behind by the fold of the peritoneum which is reflected over the posterior surface of the bladder, it is to be pushed through the projecting part of the swelling, in the direction of the axis of the bladder. The finger and the stylet are then to be withdrawn, while the canula is firmly held with the thumb and index-finger of the left hand.

When the bladder has been emptied, the canula, if desirable, may be withdrawn, and a flexible catheter introduced in its stead. In two or three days this instrument may also be removed, as the opening through the recto-vesical septum will then be sufficiently large to enable the urine to escape.

Catheterism of the Urinary Passages.

I.—CATHETERISM OF THE MALE.

Ordinary Method.

When the canal of the urethra is perfectly unobstructed, the operation may be performed with a gum-elastic catheter, from fifteen to eighteen inches in length, and from two to three lines in diameter. With regard to the curve, it should comprehend one-third of the length of the instrument from the rounded extremity or beak, and represent the segment of a circle of six inches in diameter.

Operation.—Having selected a proper catheter, it is to be well oiled, and warmed before a fire, or in the hand. This precaution is always necessary in order to avoid the unfavourable impression which the instrument must necessarily produce when its temperature is lower than that of the canal of the urethra. The success of the operation, in fact, not unfrequently depends upon this circumstance. The patient is then to be placed upon the edge of the bed, his head and shoulders are to be elevated, and his thighs are to be gently flexed upon the pelvis and separated. The surgeon, standing on the left side of the patient, is to draw back the prepuce, and to hold the penis in a vertical position between the thumb and fore-finger of his left hand. The handle of the catheter is then to be held between the thumb and fore-finger of the right hand, and to rest with the back of the little finger against the patient's abdomen, parallel with the linea alba. Taking care now to keep the handle in this position, the beak is to be introduced into the urethra; and while the penis is extended, and drawn forwards, over the instrument, the latter is gently pushed on, until its beak has reached the arch of the pubes. In this stage

of the operation great care should be taken not to let the beak of the instrument rest against the lower wall of the urethra, especially when it has arrived in the bulbous and prostatic portions, for, if this precaution be neglected, the catheter will be inevitably arrested, as has been proved by M. Amussat, in the first case, by the folds of the lining of the passage, and in the second, by the double cul-de-sac on the sides of the caput gallinaginis.

When the catheter has passed under the arch of the pubes, its handle should be very slowly brought forwards in a vertical direction, and then depressed towards the thighs. By this manœuvre the beak of the instrument will be elevated, and glide through the neck of the bladder, a circumstance which may always be known by the want of resistance and the issue of the urine. During this stage of the operation, in which the handle of the instrument is brought between the thighs of the patient, the catheter should be gently pushed into the bladder; for, if this be neglected, its beak will strike against the sub-pubic ligament and become arrested. It must be recollected, however, that this progressive motion is to be made slowly, and in such a manner that the catheter shall glide as much by its own weight as by the impulse which is given to it. "It is usually at this particular moment," observes Professor Boyer, "when the handle of the instrument is depressed towards the patient's thighs that the surgeon experiences some difficulty in introducing its beak into the neck of the bladder. This difficulty is almost always owing to the circumstance that, instead of pressing the instrument gently in the direction of a straight line, extending from the middle of its convexity to its extremity, at the same time that its handle is removed from the abdomen, the surgeon elevates the beak of the catheter, by making it act, if we may be allowed the expression, as a lever of the first kind. When the instrument has been arrested by any of the obstacles just mentioned, it will be necessary, instead of forcing it on, to draw it back a few lines, and then attempt to pass it on again by slightly changing its direction. If this second attempt, however, be unsuccessful, and it be found that the catheter is arrested in the perineum, the hand with which the penis is supported should be carried below the scrotum, in order to ascertain on what side the beak of the instrument deviates, so as to be able to give it a proper direction, while the surgeon pushes it gently on.—When the catheter, however, has passed the perineum, and is arrested near the neck of the bladder, it will be necessary to introduce the finger into the rectum, and thus direct the beak of the instrument."

Cautions to be observed after the introduction of the instrument.—After the introduction of the catheter, it will be proper, in order to facilitate the discharge of the urine, to make gentle pressure upon the hypogastrium, and if there be no necessity for leaving the instrument in the bladder, it should be gently withdrawn.

If, on the contrary, the catheter is to be left in the urethra, it should always be properly fixed, in the manner we shall presently state, in order to prevent it from slipping out, or passing in too far.

Under ordinary circumstances the metallic catheter should not be left in the urethra more than a few hours, and as a general rule, in fact, it should always be removed as soon as the urine has been discharged, and be immediately replaced by a gum-elastic one. In case it is to be feared that there will be some difficulty in introducing this instrument, or when it is desirable to obviate another catheterism, recourse may be had to the following method, which has been suggested by M. Amussat; but for this purpose it will be necessary to use at first a metallic catheter, deprived of its rings and having a stylet, the head of which is adapted, by means of a screw, to the orifice of the instrument. After having entered the bladder and given passage to the urine by withdrawing the stylet, this instrument is to be screwed to the open extremity of the metallic catheter. A gum-elastic catheter, open at both ends, is then to be glided over the other instruments, and when it has arrived in the bladder, the metallic catheter and its stylet are to be withdrawn.

APPARATUS FOR RETAINING THE CATHETER IN THE BLADDER.

This apparatus consists of two gum-elastic rings, one of which should be large enough to encircle the penis, and of four pieces of tape long enough to reach from the middle of the penis to within five or six lines beyond the meatus urinarius: the ends of these tapes are to be sewed to each ring. Having introduced the catheter into the bladder with the precaution not to let it project too far into its cavity, the large ring is to be passed round the penis, and the small one round the upper end of the instrument. The apparatus is then to be fixed by means of a narrow tape passed round the catheter, as near as possible to the small ring, with sufficient firmness to prevent the instrument from slipping farther into the cavity of the bladder. This inconvenience may likewise be more effectually obviated by applying immediately over the catheter a small strip of cotton, which soon becomes wet and shrinks so much as to keep the instrument in its place.

This apparatus, when properly applied, has the advantage of keeping the instrument perfectly in its place, and does not prevent the erection of the penis, which is always rendered so painful by the application of other contrivances.

Another method of retaining the catheter in the bladder, consists in tying two strong ligatures, each about one yard in length, firmly round the instrument, immediately in front of the orifice of the urethra. The two ends of each ligature are

then to be tied on each side near the root of the penis, and one of them is to be passed under the thigh and the other over the groin, to be fixed to a towel or bandage carried round the patient's pelvis.

II.—CATHETERISM OF THE FEMALE.

Having placed the patient upon her back, and oiled the instrument, the surgeon takes it in his right hand, while he separates the labia with the thumb and fore-finger of the left hand, so as to ascertain the precise situation of the orifice of the meatus urinarius. Holding the concavity of the catheter forwards, the surgeon then introduces the instrument upwards into the bladder, taking care to use the fore-finger of his left hand as a guide.

If the patient desires not to be exposed or uncovered during the operation, the surgeon should endeavour to direct the instrument by means of the thumb placed below the clitoris.

As the situation of the orifice of the meatus urinarius, is not always exactly the same, and is therefore sometimes difficult to be discovered, it is necessary, in order to prevent any disagreeable embarrassment, that the surgeon should bear in mind, that the orifice of the urethra in young females is situated in the triangular space, which is bounded superiorly by the clitoris, on the sides by the nymphæ, and below by the vagina. It should also be remembered, that the orifice gradually recedes from before backwards, and approaches nearer to the vagina, in proportion to the age of the individual, and that it may even sometimes be found at the anterior and upper part of this cavity, or even behind the symphysis pubis. In this case, it may not unfrequently happen, especially in the hands of a careless surgeon, that the instrument is passed into the vagina, instead of being introduced into the urethra.

In females it is seldom necessary to leave the catheter in the bladder. If this be required, however, the instrument should be secured to the vertical pieces of a double T-bandage, by means of a few threads. But in this case, great care should be taken to place a few small compresses under the bandage to prevent it from wounding the labia pudendi.

PARALYSIS OF THE BLADDER.

Whatever may be the cause of this affection, the first thing to be done, is to draw off the accumulated urine, either by the introduction of the catheter, if the urethra be unobstructed, or by puncturing the bladder, if the instrument can not be introduced through the natural passage. This is the only means of obviating the extreme distention of the bladder, which must

always necessarily give rise to a complete loss of contractility of its parietes and sometimes to inflammation and laceration. When this urgent indication has been fulfilled, it will be necessary to endeavour to restore the contractile power of the organ for this purpose it will be sufficient, when the subject is young and the paralysis slight, frequently to empty the bladder, but in old people we are obliged to resort to other means, which we shall now proceed to notice.

In order to prevent further accumulations of urine, it will be necessary to keep a gum-elastic catheter in the bladder, and to draw off the fluid frequently during the day. If, after some time, the urine flows in a full rapid stream from the catheter, and passes at the same time between the canal of the urethra and the instrument, there will be reason to conclude that the bladder has recovered its contractile power, and that it can empty itself without the aid of the catheter. If the patient, however, has frequent desires to discharge his urine; if he feels a sense of weight about the neck of the bladder, and the water is passed slowly and imperfectly, this organ has not completely recovered its tone, and the employment of the instrument will still be necessary, until it be proved by a subsequent trial that the bladder has recovered its former activity. At the same time we should endeavour to excite the contractile powers of the bladder by injecting Barrège water, or some of the aromatic infusions, by the employment of the cold bath, the methodical application of galvanism, and frictions with the tincture of cantharides or other irritating substances upon the thighs, the loins, and the hypogastric region. The time which the bladder takes to regain its power of contracting, is generally extremely variable, and often so much protracted, that it is frequently necessary to continue this treatment for two or three months; but if, at this time, the urine can not be passed, all hopes of effecting a cure will be dissipated, and the patient must be condemned to wear constantly a catheter in his urethra. This measure is particularly necessary, in case the patient suffers from what is called a *catarrhus vesicæ*, a complication which is by no means uncommon in old people.

CLOSURE OF THE URETHRA.

Amongst the ordinary causes of retention of urine, besides the paralysis of the bladder, which formed the subject of the preceding article, the most frequent are: 1st, Swelling and inflammation of the prostate gland, or of the urethra, which should always be subdued before we attempt to introduce the catheter, by general and local bleeding, by the warm bath, emollient fomentations, mucilaginous drinks, and anodyne injections; 2ndly, Spasm of the urethra, which is to be subdued by the same means, and especially by the use of opium, given internally, or conveyed into the urethra by means of a

catheter, or the tincture of the hydrochlorate of iron, which some practitioners regard as a specific in the case before us; and 3rdly, The complete closure of the canal, in consequence of the thickening of its parietes, or the presence of a foreign body.

A.—THICKENING OF THE PARIETES OF THE URETHRA.

When the urethra is so much obstructed by a stricture as to render it impossible to introduce the finest bougie, the only means of re-establishing the continuity of the canal, is the operation called *forced catheterism*. This operation, however, can only succeed in skilful hands. It consists, according to the method of M. Boyer, in piercing the contracted parts of the canal, in the direction of the urethra, with a conical silver catheter, which has a thin blunt-pointed extremity. In introducing this instrument, "the patient," says M. Boyer, "is to be placed upon the left edge of the bed, while the surgeon takes the catheter, well oiled, and passes it gently into the urethra, as far as the obstruction. When the instrument has arrived there, the surgeon carries his left index-finger into the rectum, and draws the penis, as it were, over the catheter, which is held between the thumb and index-finger of the other hand. The instrument is then to be passed in the direction of the urethra, without inclining it to either side, with a force proportioned to the degree of the resistance which it experiences. When the catheter has arrived in the bladder, it may be readily known by the want of resistance, and the depth to which the instrument has penetrated." The treatment after the operation is the same as that of incomplete strictures, which we have already pointed out.

B.—CALCULI AND OTHER FOREIGN BODIES IN THE URETHRA.

When a calculus, or any other rounded foreign body is lodged in the urethra, it may be extracted with a brass or silver wire, made into a loop, or, if the body be near the external orifice, with a simple curette, or a pair of small dissecting forceps. When the foreign body consists of a bougie, a pin, &c. and is closely embraced by the urethra, we should endeavour to extract it with the forceps, invented for the purpose by Mr. Hunter, or a similar instrument, if the substance occupy the straight portion of the urethra, or the curved forceps of Sir Astley Cooper, if it be under the arch of the pubes. These instruments generally answer the purpose; but sometimes we are obliged to have recourse to such means as may be suggested by the nature of the body that is to be extracted, its situation, and various other circumstances. In this

manner, M. Viguerie, of Toulouse, adopted the following ingenious method of extracting a portion of a catheter from the urethra: Having requested an assistant to compress the urethra, he introduced into this canal a catheter equal in size to the one which he wished to withdraw, open at both extremities, and provided with a stylet. The stylet was then passed through the fragment, which was now readily extracted.

Whatever may be the instrument that is employed, it is always necessary to render the canal of the urethra more slippery by oily injections, in order that the extraction of the foreign body may be attended with less pain, and be done with more facility. This method alone has sometimes been sufficient to expel the foreign substance.

When, however, the foreign body is too large to be taken out in this manner, or when it is so rough that it can not be expelled without great pain, it must be extracted by an incision. This operation, which is called urethrotomy, is performed differently, according to the circumstances of the case.

URETHROTOMY.

When the foreign body is lodged in the spongy portion of the urethra, the surgeon fixes it with the thumb and index-finger of the left hand, while with the other he takes a common bistoury, and cuts directly upon it, taking care to carry the incision to a sufficient extent to enable him to extract the body with ease. If possible, the surgeon should always pass a grooved director between the foreign body and the urethra, so as to serve as a guide to the point of the instrument, and allow the incision to be made with more neatness. When the incision is finished, the foreign substance should be extracted with the fingers, a pair of dressing forceps, or a curette. If a gum-elastic catheter be now kept in the urethra, so as to prevent the urine from becoming infiltrated into the cellular tissue of the penis and scrotum, the wound will speedily heal.

When the foreign body is lodged in the fossa navicularis, it may be readily extracted by enlarging the orifice of the urethra, by means of a bistoury carried from within outwards.

When the foreign substance is arrested in the membranous portion of the urethra, it should be extracted as speedily as possible, in order to prevent it from producing an incurable urinary fistula, or other serious mischief. For this purpose the patient should be placed in the same position as in the operation of lithotomy. The surgeon then introduces his left index finger into the rectum upon the foreign body, pushes it towards the perineum, the skin of which is to be held by an assistant, and makes an oblique incision, commencing a little below the arch of the pubes, and extending towards the tuberosity of the left ischium. This incision, which should be proportioned to the size of the tumour, should only extend

through the external parts. Another incision is now to be made, in order to expose the foreign body; which is to be pushed forwards with the finger in the rectum, and extracted with a pair of dressing or polypus-forceps, a curette, or any other instrument that may appear most convenient for the purpose. As the operation is always more easy when we are able to pass a catheter between the urethra and the foreign body, this should never be neglected, when practicable.

When the foreign substance consists of a calculus, the surgeon should always ascertain, after it is extracted, whether there be any more in the bladder. When this is found to be the case, they should always be carefully extracted by extending the incision as far as the prostate gland. If, on the contrary, it be found that there are none, a large elastic catheter should be introduced into the urethra so as to prevent the infiltration of urine; after which the edges of the wound are to be carefully approximated and kept in contact by the ordinary means.

URINARY FISTULÆ.

A.—Fistulæ in Perinæo.

Whatever may be the cause of the formation of a urinary fistula, the number and situation of its external openings, and its complications, the treatment is always founded upon the employment of the catheter, which is to be kept in the urethra until the parts have perfectly healed. In the most simple cases of the disease, a cure may generally be effected by removing the cause of the complete closure or stricture of the urethra, and by re-establishing the natural route of the urine by letting a catheter remain in the canal until the fistulous track is completely closed. In many cases the employment of the catheter alone gives rise to the obliteration of numerous fistulous orifices; but it is necessary, in order to effect this, that the urine should pass entirely through the instrument; for, if the smallest quantity of it escape between it and the urethra, it will be impossible to effect a cure. Hence, it becomes absolutely necessary to introduce as large a sized catheter as possible, and if this be not sufficient, it should be kept constantly open, so as to enable the urine to dribble away. When this precaution, however, is of no avail, or the instrument produces so much irritation that it can not possibly be worn, great benefit may generally be derived from the employment of gum-elastic bougies, or, as is preferred by M. Marjolin, from the use of the simple bougies of Daran, which are to be gradually increased, and are to be withdrawn as often as the patient wishes to make water.—For an account of the manner of introducing these instruments, see the article on strictures of the urethra.

When the fistulous orifice has become closed, it will be necessary, in order to obviate a relapse, to keep the urethra in such a state of dilatation, as to enable the urine to be discharged with perfect ease. For this purpose the patient should continue the use of a catheter or bougie for a considerable time after the parts have perfectly healed.

When the fistula is complicated with the presence of a calculus or other foreign substance, it will be necessary, in order to effect a cure, to extract it as speedily as possible.

In case there are callosities, the treatment which we have just mentioned, and the application of emollient poultices will generally be capable of dispersing them, unless they are very deep-seated and of long standing; in which circumstance it will be necessary to enlarge the fistulous orifice with a bistoury, so as to promote the discharge of the matter and excite adhesive inflammation in the parts. When this, however, is not sufficient, and the fistulous track has burrowed far under the skin, in an almost horizontal direction, it should be carefully laid open from one end to the other. In case the openings are so numerous, that it is impossible to introduce a catheter into the urethra, and there are symptoms of severe constitutional disturbance, surgeons have recommended cutting away the callosities or the cribriform portions of the integuments of the fistulous orifices, in order to ascertain the aperture through which the urine is principally discharged, and to oblige the patient to wear a catheter, until the natural passage of the urethra has been restored by the use of bougies. It has also been recommended, in case the employment of these means is unattended with success, to make an incision through the neck of the bladder and oblige the patient to wear a canula. In performing this operation, the surgeon should direct himself to the inner orifice of the fistula by means of a staff, and then divide the parts as far as the neck of the bladder inclusively, with a narrow bistoury. A canula should now be introduced, and kept in the bladder until the obstruction in the urethra is completely destroyed, and the natural course of the urine re-established.

B.—VESICO-VAGINAL FISTULÆ.

Vesico-vaginal fistulæ are generally produced by difficult labours, and are almost always attended with loss of substance. They may be cured, like the fistulæ of which we have just spoken, by diverting the stream of the urine and obliging it to pass through the natural passages. To effect this object, it is necessary to introduce a large gum-elastic catheter, and to fix it in such a manner that its lateral openings shall be constantly in the most depending part of the bladder. For this purpose, we may employ the machine which was invented by Desault. This machine is made in the manner of a truss, and answers

extremely well for fastening the catheter. As this mode of treatment, however, is generally very protracted, it will be advisable to have recourse to the operation of Professor Dupuytren, which consists in introducing into the vagina a conical speculum uteri, having a lateral aperture, so as to enable the surgeon to perceive the fistulous orifice, the edges of which are to be cauterized with the hot iron: a catheter is then to be introduced into the bladder, and worn as long as circumstances may require.—The cauterization is to be repeated until there is a complete obliteration of the fistula.

RECTO-VESICAL FISTULÆ.

In the treatment of this disease, our first object should be to introduce a large catheter into the bladder, and to oblige the patient to wear it, as long as may be necessary, at the same time that we endeavour to restore the natural passage of the urethra or anus. This treatment, however, which seldom succeeds where the fistulous opening is very narrow, is always unattended with success when the internal orifice of the fistula is very large and situated at the most depending part of the bladder.

The best means that can perhaps be employed in cases of fistula of this description, consists in cauterizing the edges of the orifice with the hot iron or the nitrate of silver, in the same manner as in cases of vesico-vaginal fistula.

When a recto-vesical fistula succeeds to the operation of lithotomy, and can not be cured by the employment of the actual or potential cautery, the best thing that can be done is to divide the parts which are comprised between the internal and external orifices of the fistula and the margin of the anus. Before commencing this operation, a catheter is to be introduced into the bladder, and a staff is to be passed across the fistulous opening of the perineum, until it comes in contact with the preceding instrument. By means of the finger placed in the rectum, the point of the staff is then to be carried through the fistulous orifice which opens into the intestine, after which the catheter is to be withdrawn, and the parts are to be divided as in the operation for fistula in ano. When the operation is finished, a gum-elastic catheter is to be introduced into the urethra, and the edges of the wound are to be kept from healing, until the old fistulous track is closed, by means of lint.

STONE IN THE BLADDER.

The two principal therapeutic methods which are employed at the present day with a view of relieving patients of this dangerous affection, possess each particular advantages and inconveniences, and though they are equally beneficial, they are

far from being perfect. These two methods, however, are by no means indiscriminately applicable, in all cases of this dreadful affection. One of them, which was already in use amongst the ancients, consists in opening the bladder, in order to extract the foreign body, and is called cystotomy; the other, which has lately been devised by Dr. Civiale of Paris, and was first performed by him upon the living subject, is called lithontrity, and consists in reducing the calculus in the bladder into small particles, which are voided with the urine, so as to render the operation of lithotomy unnecessary.

Neither of these operations should be undertaken, until the patient has been carefully sounded, in order to ascertain the nature, size and situation of the stone.

This important preliminary operation, which consists in introducing a sound, in the manner we have already had occasion to state, should always be performed with the utmost care. Great attention should also be paid to the curve of the instrument, which must sometimes be considerable, especially when the stone is situated at the *bas-fond* of the bladder; in which circumstance it should be bent in the form of the letter S. In performing Dr. Civiale's operation, the size of the stone may usually be ascertained by means of the forceps of the lithontriptor. After this instrument has passed the neck of the bladder, its blades are to be slightly separated, and the stone is to be grasped with the forceps. The diameter of the foreign body will then be indicated by the degree of the separation of the blades, which is shown by the figures upon the handle of the lithontriptor.

Whatever instrument be employed, it should never be introduced before the bladder has been distended, either with urine, or by the injection of some mild fluid. When the beak of the sound has arrived at the neck of the organ, it should be passed in a slow and gradual manner, and care should be taken to observe whether it experience any impediment, without producing a shock, on entering the bladder, which always happens when the stone is small and is lodged in its neck. After the instrument has entered the bladder, its concavity should be directed successively towards the *bas-fond*, from one side to the other, and towards the abdomen. If, after all these precautions, no calculus can be discovered, it will be necessary to put the patient in different positions, in order to facilitate our endeavours. Thus, when he stands up, the surgeon should move the sound from above downwards, and from before backwards, as if he wished to withdraw and re-introduce it into the bladder. The patient may then be requested to bend forwards, or to sit upon his knees and elbows; and if this do not succeed, the urine may be gradually discharged, while the surgeon continues the movement of the instrument. In this case, it generally happens that the bladder contracts upon the foreign body, so as to bring it towards its neck, and in contact with the sound. If these first attempts, however, be un-

attended with success, they should by all means be repeated, until we have ascertained the presence of the stone, and distinctly heard the noise which results from its coming into contact with the instrument. These examinations should be conducted with the utmost care, and the surgeon should constantly guard against deceptive impressions; he should recollect that the most skilful lithotomists have sometimes been unable to detect the presence of a stone, although it was evidently contained in the bladder, and that patients have often been operated upon for stone, when in fact their bladders contained nothing but an osseous cyst, a mucous induration, or a scirrhus tumour.

If the surgeon experience much difficulty in ascertaining the presence of a calculus, he should adopt the practice first pointed out by Dr. Physick, which is to place the patient nearly on his head, so as to render the fundus of the bladder the lowest part, and thus bring the foreign body into contact with the point of the sound.

As soon as the existence of the stone has been ascertained, the next thing to be done is to decide upon the most expedient method of relieving the patient.

As a general rule, we should have recourse to the operation of lithontrity when the stone is perfectly loose, and is no more than eighteen or twenty lines in diameter; and when the introduction and play of the lithontriptic instrument experience no difficulty from the curvature of the urethra, from a diseased state of the prostate, the extreme irritability of the urinary organs, or a softening of the bladder. This operation should also be preferred when there is an evident calculous diathesis, from the fact that, under these circumstances, the disease is always apt to return, and requires that the operation should be repeated.

Cystotomy, on the contrary, is always indicated when there is a very large stone or a great number of small ones, and when the bladder or prostate gland is extremely irritable or in a state of disease.

Neither of these operations, however, should be performed when the stone is enormously large, when there is a severe chronic affection of the urinary organs, and when the patient is far advanced in years, and his constitution is impaired from the effects of other diseases.

CYSTOTOMY, OR OPERATION OF LITHOTOMY.

I.—*In Men.*

A.—LATERAL OPERATION.

The lateral operation, which is at present almost exclusively adopted in France, consists in making an incision upon the left side of the perinæum, commencing about one inch in front of the

anus, and extending as far as the middle of a straight line drawn from the anus to the tuberosity of the ischium, including the adipose cellular tissue which is contained in the space between the erector penis and accelerator urinæ muscles, the transversus perinæi, the anterior fibres of the levator ani, and the membranous part of the urethra, and in dividing from within outwards, according to the method of Frère Côme, the neck of the bladder and the left lateral part of the prostate, by means of the instrument called the *lithotôme caché*.—We shall now proceed to give an account of this operation as described by Professor Boyer.

Apparatus.—The instruments which are required for performing this operation, are a silver catheter, and a grooved staff of as large a size as will easily admit of introduction; a lithotôme caché; a sharp gorget; a large scalpel for making the first incision; a blunt-pointed curved bistoury; forceps of various sizes and forms, for extracting the stone; a syringe for washing out coagula of blood or particles of stone; several gum-elastic or silver canulæ; ligatures, and a pair of ligature-forceps; two strong garters, or bands, for tying the patient's hands and feet; a bowl of warm oil; and basins containing tepid water, and a decoction of marsh-mallows.

Preliminary arrangements.—Before the operation is commenced, it is necessary to procure a firm table, of sufficient height, about three feet in width and from four to five in length. This table is to be covered with a mattress, which is fastened with a rope, and arranged in such a manner as not to pass over the edge upon which the patient is to be placed; a pillow should then be laid at its upper end, and the mattress should be covered with a folded sheet, which is to be left hanging to within a foot of the floor. About an hour before the operation is commenced, care should be taken to shave the perinæum, and to empty the rectum by means of a clyster. This last precaution is of the utmost importance, and should never be neglected. It need scarcely be remarked here, that, a short time before the operation, the patient should be kept on low diet, take the warm bath, and drink plentifully of diluent drinks: he should also be desired to refrain from sleeping on the day on which the operation is to be performed, and if he be irritable, he should take about fifty drops of laudanum.—Five assistants are usually required in this operation, two for holding the thighs and legs of the patient, one for steadying the shoulders, another for holding the sound and the scrotum, and the fifth for handing the instruments to the operator. In operating upon children, it is necessary to have another assistant to steady the pelvis, by placing his hands upon the spine of the ilium.

Having every thing ready, the patient is to be placed upon his back, his head is to be slightly elevated, and his thighs and legs are to be held by two assistants. The surgeon then takes the staff, first dipped in oil, and after having introduced it,

and ascertained that the stone is really in the bladder, the instrument is to be given to an assistant standing on the left side of the patient. Two strong garters or ligatures, each about two yards in length, are then to be doubled, and placed by means of a noose round the patient's wrists, who is next to take hold of his feet with his hands, in such a manner that the fingers shall be applied to the soles and the thumbs upon the dorsal surface. The two ends of the garter are then to be carried in opposite directions round the ankle, over the back part of the hand, and under the foot, so as to form a kind of figure of 8; after which they are to be tied in a bow.

The ligature being thus applied at the same time on each side, the two assistants who are to hold the extremities, apply the patient's knees against their breasts with the right hand, while they take hold of the soles of the feet with their left. Another assistant, who stands behind the patient, applies his hands upon his shoulders to prevent him from moving back, while the one who hands the instruments is to stand on the left of the surgeon.

Operation.—First stage.—"Every thing being thus arranged, the operator, standing between the thighs of the patient and a little towards the left side, places the staff in a direction perpendicular to the axis of the body, by inclining its handle towards the patient's right groin, and gives it to an assistant, who is to be requested to hold it perfectly steady. If the scrotum be small, he should hold it up with the ulnar edge of the left hand, and extend the skin of the perinæum transversely with the thumb and fore-finger; but if it be large and pendulous, the assistant who holds the staff should keep it up with the left hand, taking care not to compress the testicles, and draw the skin of the perinæum from below upwards. The surgeon then takes a scalpel in his right hand, and holding it as in cutting from without inwards, he makes an incision through the skin and adipose cellular tissue on the left side of the perinæum, extending from the raphe, at about an inch above the anus, to the middle of a straight line drawn from the anus to the top of the tuberosity of the ischium." This incision should be from two to three inches in length, and extend merely through the skin, the adipose cellular tissue, some of the fibres of the erector penis and accelerator urinæ, the transversus perinæi and the anterior fibres of the levator ani muscles. It may be laid down, as a general rule, that it should rather be too large than too small, in order to prevent urinary infiltrations. In corpulent individuals, this first incision does often not extend as far as the urethra, so that it becomes necessary to make it deeper. When it is finished, the surgeon is to introduce the left index-finger, in order to ascertain the situation of the sound and judge of the thickness of the parts by which it is covered. If this thickness be considerable, it will be requisite to extend the incision still deeper; after which the index-finger is to be disposed in such a manner that its radial edge shall

look downwards, and that the left edge of the groove of the staff shall be lodged in the hollow which separates the nail from the bulb of the finger. The operator then takes a straight bistoury, held like a writing pen, carries its point upon the nail, and passes it into the groove of the staff across the parietes of the urethra. When it has arrived there, which may always be known by the immediate contact of the two instruments, the extremity of the finger is to be applied upon the back of the bistoury, and while its handle is gently raised, its point is to be passed into the groove of the staff. The handle of the bistoury is then to be depressed, in order to make the instrument describe the segment of a circle round its point, which is to be kept firmly fixed, and to divide the part of the urethra by which it is covered. The incision of the urethra should be from eight to ten lines in length, and should extend, if possible, merely through its membranous portion. When this incision has been made, the surgeon takes the lithotome caché in his right hand, and passes its beak into the groove of the staff. Having done this, he takes hold of the handle of the latter instrument with his left hand, and brings it towards the arch of the pubes, at the same time that he pushes the lithotome from below upwards, in order that its beak may retain its situation in the groove. The lithotome being thus introduced into the bladder, its beak is to be gently struck against the staff, and after having ascertained that it is still in the groove, it is to be pushed in as far as the point where its extremity terminates in a cul-de-sac, at the same time that the handle of the staff is brought a little towards the surgeon. The latter instrument is then to be withdrawn, while the operator takes the lithotome at the junction of the blade and sheath with the thumb and fore-finger of the left hand, and holding it in a position parallel to the external wound, he disengages the cutting blade of the instrument from its sheath. The surgeon is then to draw the lithotome towards himself, in a perfectly horizontal direction, so as to make the requisite division of the prostate gland and neck of the bladder.

“The great art of conducting the lithotome,” observes M. Boyer, “consists in giving it a perfectly horizontal direction, and in carrying the edge of the blade parallel to the incision in the integuments. If the handle of the instrument be elevated, there will be danger of wounding the bas-fond of the bladder; if it be depressed, the incision through the prostate gland and neck of the bladder will not be proportioned to the degree of the opening of the blade; if the blade of the instrument be directed too far outwards, there will be danger of injuring the inferior, and, perhaps, the deep-seated branch of the internal pudic artery; and if the edge be carried too far down, it will be likely to interfere with the rectum.” In order to avoid these inconveniences, this surgeon has advised, in operating upon adults and old people, never to open the blade of the lithotome beyond No. 11, and in most cases not

farther than No. 9, preferring to enlarge the incision, if this be found necessary, to making it too large in the first instance. M. Boyer is also in the habit of applying the beak of the lithotome against the neck of the bladder, instead of letting it rest against the arch of the pubes, and of holding it in a transverse direction. After the prostate gland and neck of the bladder have been divided to the requisite extent, he again fixes the sheath to the instrument, and then withdraws it. By this method, the internal incision is almost transverse, and forms a very obtuse angle with the external opening; but this angle may be readily effaced by pressing it with the finger, and presents no impediment to the introduction of the forceps, or the extraction of the stone. The author states that he has been in the habit of using the lithotome in this manner for the last ten years, and that he has never opened an artery large enough to produce any unpleasant hemorrhage.

Second stage of the operation.—After having made the requisite division of the prostate gland and orifice of the bladder, the surgeon introduces the left index-finger into the wound, in order to ascertain its extent, and be able to judge of the situation and size of the stone; this finger is also to be used to guide the forceps, unless the patient is very fat, and has a very enlarged prostate; in which circumstance it will be impossible to carry the finger into the bladder, and as it is then to be feared that the forceps will become entangled in the cellular tissue, and pass between the prostate and the rectum, it will be necessary to have recourse to another expedient. This consists in placing the fore-finger in the inferior angle of the wound, and in applying the concavity of a gorget upon its radial edge, and introducing it into the bladder by pushing it from below upwards. When the gorget has arrived in the bladder, the finger is to be withdrawn, and the concavity of the instrument is to be brought upwards, while its convexity is to be made to rest slightly against the inferior angle of the wound. The surgeon then takes the forceps, and passing the index-finger along their blades, he makes them glide obliquely from below upwards, into the groove of the gorget, taking care that their convex surface shall correspond with the sides of the wound.

As soon as the forceps have arrived in the bladder, which may be readily known by the cessation of the resistance, the gorget is to be withdrawn. The instrument is then to be shut, and carefully carried into the lower part of the bladder, where the stone is usually situated; and when it is found, the forceps are to be immediately opened over it, and after slightly depressing the blades, they are to be gently shut, so as to grasp it. In this manner the stone may generally be easily extracted; but it sometimes happens that the extraction is attended with considerable difficulty, owing to the surgeon having grasped the stone in a transverse position, in which circumstance it will be better to try to change its direction, or

to let it go entirely, and take hold of it in another manner. When the stone is very small, and can not be easily discovered, it will be necessary to carry the forceps into the lower part of the bladder, and alternately separate and shut its blades, until it is grasped. When the stone is situated very deeply in the lower part of the bladder, it will sometimes be requisite to use a pair of curved forceps, the concavity of which should be directed downwards; and when the stone is firmly grasped, they are to be withdrawn, precisely in the same manner in which they were introduced.

When the stone is grasped, which may always be known by an inability to approximate the handle of the instrument, it should be slowly withdrawn, by moving the forceps from side to side. Before this be attempted, however, the instrument should always be gently rotated, in order to ascertain that it does not include the coats of the bladder. When the stone is seized, it should be held with sufficient firmness to keep it from slipping from the blades, but not so forcibly as to incur the risk of breaking it. When this accident, however, happens, the larger pieces of the stone must be extracted with the forceps, directed upon the left index-finger, and the smaller ones by means of injections of tepid water.

When the stone is so large that it can not be extracted without difficulty, it will be necessary to alternately elevate and depress the blades of the forceps, taking care to rest the instrument against the inferior angle of the wound, in order to facilitate the extraction. If the stone, after having passed the prostate gland and neck of the bladder, be retained between the edges of the external wound, the surgeon should take a probe-pointed bistoury, introduced under the guidance of the fore-finger of the left hand, and enlarge the opening.

When the stone has slipped away from the blades of the forceps, the fore-finger of the left hand should be introduced into the wound, and the stone should be grasped in a different direction. When the foreign body is so large that it can not be laid hold of with ease, it must either be extracted with a scoop, or pushed back and be grasped with a smaller instrument.

In case the stone is so extremely large that it can not be extracted, even after the wound has been enlarged, it will be necessary, either to remove it by the high operation, or to break it up with the lithontriptic instruments of Dr. Civiale, and then extract the fragments with a scoop and injections of tepid water.

When the stone is withdrawn, the surgeon should always introduce the finger, to satisfy himself that no other stones remain in the bladder; but, if this is found to be the case, they should be immediately extracted, unless they are very numerous, in which circumstance it will be better to remove them at a subsequent operation. The operation should also be deferred when there is much hemorrhage, for, under these cir-

circumstances, the foreign body will often come away spontaneously, if care be taken to prevent the cicatrization of the wound by daily introducing the fingers, well oiled; but if this does not take place in a short time after the operation, the stone should be extracted as soon as the inflammatory symptoms have sufficiently abated.

When the stone does not lie loose in the bladder, as it not unfrequently happens, the conduct of the surgeon must be regulated by the nature of the adhesions. If it be embedded in a sacculus, with an open orifice, and there is reason to conclude that it does not adhere to the parietes of the sac, it should be grasped with a pair of forceps carried into the bladder under the guidance of the fore-finger of the left hand, and be gently and slowly moved from one side to the other; and as soon as it begins to give way, it should be extracted by slightly rotating the instrument, and moving it alternately from right to left and from left to right.

If, however, it resists the efforts of the instrument, and gives rise to considerable pain, the attempts at extraction should be for the time discontinued, and afterwards more or less frequently repeated, until the stone can be easily detached.

If it be found by a careful examination with the finger, that the calculus can not be extracted on account of the narrowness of the orifice of the sacculus, it will be necessary to enlarge this opening with a long probe-pointed bistoury, having a narrow blade, and cutting only near its point.

In cases of encysted calculi, it is always necessary to open the containing pouch with a probe-pointed bistoury, provided it be within the surgeon's reach, otherwise it must be abandoned.

Treatment after the operation.—When the operation is finished, the patient should be placed in bed on his back, his thighs should be slightly flexed upon the pelvis, and the knees should be supported by a proper roller. The dressings consist simply in elevating the scrotum with a kind of suspensory bag, and in covering the abdomen with emollient fomentations. If, as it usually happens, the patient complains of severe pain in the neck of the bladder, the anus, along the urethra and end of the penis, we should endeavour to subdue it as speedily as possible by fomenting the glans, and throwing into the urethra a few drops of a mixture, composed of oil of sweet almonds, of anodyne balsam and tincture of opium.

If, in a short time after the operation, the wound is filled with coagula of blood, which adhere to the catheter, it will be of the utmost importance not to move this instrument for the first fifteen or twenty-four hours, in order to avoid the hemorrhage, which would be apt to take place by removing the obstruction which closes up the mouth of the divided vessels. When this accident, however, does not occur, the instrument should always be changed as soon as it has become moistened with urine, in order to prevent the irritation of the

skin of the nates and thighs. This last occurrence may also be obviated, by frequently washing the parts with a decoction of marsh-mallows, and covering them with fresh cerate.

The general treatment should be perfectly antiphlogistic for the first five or six days; and if, during this time, there supervene no severe inflammatory or other disagreeable symptoms, there will be every reason to conclude that the operation will be attended with happy results.

In the most simple cases, the urine usually begins to resume its natural route through the urethra about the twelfth or fourteenth day; but it is not before the twenty-fifth or thirtieth that it completely ceases to run through the wound, which is generally closed about this time.

Accidents.—The most common accidents which happen in this operation, are syncope, convulsions, hemorrhage, retention of urine, cystitis, peritonitis, urinary fistulæ, &c.; but on the present occasion we shall only speak of hemorrhage.

The first thing to be done on making the incision, if there be a copious discharge of blood, is to ascertain the situation of the divided vessel from which it proceeds. If this vessel be superficial, and can be readily perceived, it should be immediately seized, and be secured with a ligature; when this, however, can not be done, an assistant should be requested to apply his finger to the place from which the blood appears to escape, while the surgeon continues the operation; but should this not be sufficient, it will be necessary to defer the extraction of the stone until another time, and to plug the wound in the manner we shall presently state.

The hemorrhage which takes place during the first few hours or days after the operation, is always more dangerous than that which occurs in performing the operation, on account of the difficulty with which it is arrested. It is, therefore, always of the utmost importance to prevent it.

If there be reason to apprehend hemorrhage, the patient should be attentively watched, and requested to observe the most perfect rest, and if he be plethoric, it will be necessary to take away a considerable quantity of blood. When the hemorrhage is slight, it may often be arrested by applying compresses, dipped in cold vinegar, upon the hypogastric region, the scrotum and perinæum; but when it is profuse, it can only be checked with certainty, by the application of the ligature, the actual cautery, or plugging the wound. This last operation should always be preferred when the divided vessel can not be discovered, or when the blood issues from a great number of small vessels. In plugging the wound, according to the method of Professor Dupuytren, “the surgeon takes a canula, which is passed through the centre of a kind of chemise fixed to its outer extremity. These two instruments are then to be introduced into the wound, and soft lint is to be placed round the first, and in the cavity of the second, in such a manner that it shall be brought into contact with every

part of the surface of the wound. The action of the plug is also promoted by cooling the external part of the chemise, which is to be carefully closed by means of a piece of tape passed through the groove at its orifice." This compression is generally capable of arresting the bleeding; but if, notwithstanding this precaution, the blood still continues to escape, either from the external wound, or the side of the bladder, which may be known by the swelling of the hypogastric region, by the discharge of a small quantity of blood from the canula or the urethra, by tenesmus, paleness of the countenance, coldness of the extremities, and a feeble pulse, it will be necessary to remove the apparatus, and to substitute a more convenient one, taking care, if the hemorrhage proceed from the bladder, to make use previously of injections of tepid water, in order to remove the coagula of blood.

B.—HIGH OPERATION.

Having shaved the hair from off the pubes, and distended the bladder, the patient is to be placed upon a firm table, and his thighs are to be slightly flexed.* The surgeon then takes a bistoury, and makes an incision in the direction of the linea alba, between the pyramidales muscles, beginning at the pubes, and extending about two inches in length. When this incision, which is to be continued down to the external fascia, is finished, the next thing to be done is to pierce the linea alba close to the pubes, and to divide it from below upwards with a probe-pointed bistoury, guided upon the left index finger. In this step of the operation it is necessary to detach some of the fibres of the pyramidales muscles at their origin at the symphysis pubis; and the utmost care should be taken not to cut through the peritoneum.

As soon as the abdominal wall has thus been divided, the surgeon will be able to perceive the fundus of the bladder covered with loose cellular tissue. When this substance has been divided and the organ is completely exposed, a catheter, furnished with a stylet, is to be introduced into the urethra, and when the point is felt by the finger in the wound, pushing up the fundus, the stylet is to be forced through the coats of the bladder, followed by the end of the catheter. The instrument is then to be held with the thumb and index finger of the left hand, while the surgeon enlarges the opening through the fundus of the bladder, with a probe-pointed bistoury, to a sufficient extent to admit two fingers. The bladder is now to be supported by the left index finger introduced into its cavity, and the instrument is to be withdrawn. The stone is then to be extracted either with the fingers or a pair of forceps; and when the operation is finished, a flexible gum catheter is to be

* See page 351.

passed into the bladder through the urethra, and kept there until the wound has healed.

Treatment after the operation.—The treatment after the operation is precisely similar to that which is employed in the lateral operation.

If the high operation is performed, after having in vain attempted the lateral one, it is absolutely necessary that the catheter should be passed into the bladder through the wound in the perineum.

The high operation of lithotomy, which was formerly so much practised by Frere Côme, Douglass, and Cheselden, was first performed in this country by Dr. Gibson; and subsequently by my preceptor, Dr. M'Clellan, and several other physicians of Pennsylvania.

II.—CYSTOTOMY IN WOMEN.

This operation should never be performed unless the stone is so large that it can not be extracted by dilating the meatus urinarius by means of large gum-elastic catheters or cylinders of prepared sponge, or when it is impossible to break it up in the bladder by means of the lithontriptic instruments of Dr. Civiale. In this last case it will even be better to have recourse to the high operation, than to employ the method of M. Dubois, which, however, generally answers the purpose.

Method of M. Dubois.

Having placed the female as in the other operations of lithotomy, the surgeon introduces a staff or director into the bladder by the meatus urinarius, taking care that the groove of the instrument be directed upwards. An incision, proportioned to the size of the stone, is then to be made through the anterior wall of the urethra and neck of the bladder, by means of a straight bistoury; after which the calculus is to be extracted with a pair of forceps, guided upon the left index-finger, in the same manner as in the lateral operation.—This operation may also be performed with the lithôtome caché, as is done by Professor Dupuytren.

LITHONTRITY.

Civiale's Method.

Several ingenious methods have lately been invented for breaking up calculi in the bladder,* but as the limits of our

* For an account of these different methods, the reader is requested to consult our memoir upon lithontrity, published in the second volume of the "Journal des Progrès des Sciences et Institut. Méc. Paris, 1827."

work will not enable us to give an account of them all, we shall briefly describe that which has been devised by Dr. Civiale, and which, though not free from faults, has been attended with more success than any other that has yet been proposed.

Preliminary treatment.—Besides the preliminary treatment which is required in every surgical operation, it is necessary before performing the operation of lithontrity, to dilate the canal of the urethra by means of flexible catheters, which are to be gradually increased in size, and are to be daily introduced into the bladder and kept there for about ten minutes at a time. As soon as the surgeon is able to pass a catheter of three lines in diameter, without difficulty, the canal of the urethra is sufficiently dilated to enable him to introduce the lithontriptic instruments.

Having ascertained that the stone is really in the bladder, the patient is to be placed horizontally upon the edge of the bed, with the pelvis a little higher than the breast, and his head is to be elevated by pillows. The surgeon then distends the bladder by injections of tepid water, in doing which he is always to inquire of the patient, whether a sufficient quantity has been thrown in; and when this is found to be the case, the catheter is to be withdrawn.

Lithontriptor.—The lithontriptor, which should always be proportioned in strength and diameter to the age of the patient, and the presumed size and consistence of the stone, consists of three principal pieces: the external canula or sheath, the forceps or *litholabe*, and the lithontriptor, properly so called. The external canula, which is about twelve inches in length and from two to four lines in diameter, is open at both ends, and is furnished at one of them with a screw, as well as with a leather case or box, calculated to prevent the escape of the fluid which is contained in the bladder. In this canula is enclosed a kind of steel catheter, the lower extremity of which consists of three elastic branches, which are slightly curved and designed to grasp the stone on withdrawing this instrument a short distance within the outer one, when they become approximated. This internal catheter, or litholabe, glides easily within the outer canula, and may be firmly secured there by means of a screw, which passes through the first. Near its upper extremity it has also a leather case, and a graduated scale showing the degree of the separation of the branches of the litholabe. The cavity of the litholabe is capable of admitting the lithontriptor, properly so called, which is nothing else than a steel rod, furnished with a strawberry-shaped file. This rod is graduated like the litholabe, and has a pulley at its upper extremity, calculated to receive the string of a bow, with which the lithontriptor is made to turn in the tube of the forceps. The last piece belonging to the lithontriptic instrument, is a wheel which is furnished with a kind of pump-box containing a spiral spring, by which the rod of the lithon-

triptor is propelled forwards in proportion as the stone is reduced.

The lithontriptic instrument represents a large, straight catheter, and is employed in the manner we shall now proceed to notice.

Operation.—First stage.—The operator standing on the right side of the patient, or between his thighs, depresses the penis in such a manner as to bring it parallel with the thighs, which ought to be slightly flexed. He then takes the instrument in his right hand, and introduces it into the urethra. When it has arrived under the arch of the pubes, the penis is to be depressed, and the beak of the instrument is to be slightly elevated, so as to enable it to pass the prostate gland, which it usually does with facility when this organ is not enlarged or in a state of disease. When this, however, is the case, the penis should not be depressed until the instrument has reached the prostatic portion of the urethra, when its beak should be made to glide along the upper wall of the canal. As soon as the lithontriptor has arrived in the bladder, it should be directed towards the bas-fond, where the foreign body is usually found, or to any other part where there is reason to suppose it to be situated.

When the instrument has come into contact with the stone, the operator should bring the external sheath a little towards himself, in order to separate the blades of the forceps, and enable them to grasp the foreign body. As soon as the stone is grasped, the tube of the forceps is to be fixed with one hand, while with the other the inner catheter is drawn a short way within the outer one, so as to enable the blades to become approximated, and retain the calculus. Having ascertained that the stone is perfectly free from adhesions, and that the instrument does not embrace the mucous membrane of the bladder, the blades of the forceps are to be firmly approximated, and prevented from separating, by screwing the two canulæ firmly together by means of the screws at the outer extremity of the sheath.

Second stage.—When the calculus is properly secured, the operator satisfies himself of the possibility of perforating it with the lithontriptor. The apparatus is then set in motion, and in proportion as the stone is perforated, the lithontriptor is pressed evenly inwards by means of the spiral spring to which we have already alluded. The perforation should be made slowly at the beginning, and should not be continued for more than ten minutes; after which the stone is to be abandoned until a subsequent sitting. The number of sittings must depend upon the size and hardness of the stone, and the state of the patient. In withdrawing the instrument, the two canulæ are to be first unscrewed, the forceps are then to be opened, the stone pushed back by means of the lithontriptor, and the blades drawn within the sheath. When the surgeon is fully convinced that the blades of the forceps are in the

sheath of the lithonriptor, the instrument is to be carefully withdrawn. If any of the fragments of the stone are included in the forceps, and are too large to be extracted, they should be broken up by pushing the head of the perforator against the crotchet of the instrument. At the subsequent sittings, it is always necessary, before the operation is commenced, to ascertain, by means of the lithonriptor, that the stone has not been grasped in the same direction; for if this is found to be the case, it should by all means be turned. For this purpose it will be sufficient to push the blades of the forceps a little forwards, and gently rotate the lithonriptor.

Third stage.—When the perforation is finished, and the instrument is withdrawn, the patient should be desired to void his urine, in order to discharge the powder or particles of the stone. The discharge of these particles, if necessary, should be promoted by injections of tepid water, which is the most effectual means of removing them. It frequently happens, however, upon subsequent examinations, that one or two fragments are discovered, which are too large to pass through the urethra. When this is found to be the case, they must be broken up in the manner we have already stated, until they are sufficiently reduced to be voided through the urethra.

After the powdery detritus of the stone has been removed, the patient should be requested, in order to prevent inflammation of the urinary passages, to confine himself to his bed for a few hours, and to make use of a mild diet and the warm bath. As a general rule, it may be stated, that the operation should be repeated about the fourteenth or fifteenth day; and when there is reason to conclude that the calculus and its fragments have been completely discharged, the bladder should be carefully sounded, in order to be convinced that the foreign body has really been destroyed.

DISEASES OF THE RECTUM.

Imperforate Anus.

When the anus is simply covered with skin, it should be speedily opened by means of a crucial incision, and by cutting away the angles of the flaps with a pair of scissors. If the anus be only partly closed, the opening should be enlarged with a bistoury, guided upon a grooved director, and directed towards the os coccygis. A small tent of lint or prepared sponge, is afterwards to be introduced into the opening, to keep its edges from closing. This operation is also necessary, not only when there is a contraction of the anus, but even of the inferior part of the rectum; but unfortunately in cases of this description, our attempts frequently fail, either because the contraction re-appears, or because the sphincter ani

ha been so much divided, as to be unable to prevent the involuntary discharge of the fecal matter.

If the membrane which closes the rectum is situated higher up than the anus, but near it, it should be divided from before backwards with the point of a straight bistoury, guided upon the left index-finger. If, on the contrary, it be deeply seated, it should be divided by means of a knife, carried upon a grooved director, or by means of a middle-sized trocar, which is to be carried upwards and backwards, in a direction best calculated to reach the rectum, without danger to other parts.

When the rectum is completely obliterated and converted into a hard fibrous cord, or when this part of the intestine is entirely wanting, or its lower extremity is so far out of the way that it can not be reached, it will be proper to adopt the advice of Littre, which is to open the abdomen, and bring out a portion of the large intestine, so as to form an artificial anus. The most successful method, is that which has been practised by M. Duret, a naval surgeon of Brest, upon a child five days of age. This gentleman made an opening of about an inch and a half in extent, into the lower part of the left iliac region, and having opened the sigmoid flexure of the colon, he fixed it near the wound by means of two ligatures passed through the meso-colon. A great quantity of meconium was immediately discharged, and the next morning the severe symptoms had subsided. The ligatures were removed on the fifteenth day after the operation, and on the seventeenth the child was restored to its parents.

FISSURE AND STRICTURE OF THE ANUS.

These two affections frequently exist together, and the first invariably accompanies the second. Emollient applications, laxatives, cold ablutions, narcotic injections, the warm bath, leeches, and opiate salves, generally allay the sufferings of the patient for some time, but no permanent benefit can be expected without performing the operation of dividing the sphincter ani muscle. A single incision is seldom sufficient when the stricture is very strong, and it is therefore often necessary to make two, one on each side. The incision should always be made upon the fissure itself, unless it is situated at the anterior or posterior part of the anus; in which circumstance it should be made upon the sides.

OPERATION FOR FISSURE IN ANO.

Boyer's Method.

Having placed the patient upon his side, as in the operation for fistula in ano, and taken care that his bowels shall have been well opened by mild purgatives and injection, the sur-

geon passes his index finger into the rectum till it comes in contact with the fissure. A very narrow, probe-pointed bistoury is then to be passed along the finger, and when it has arrived at the desired place, the surgeon divides the intestine, the fibres of the sphincter ani muscle, the cellular tissue and skin of the nates, by a single stroke of the instrument. The apex of the triangular wound which is thus formed, corresponds to the intestine, and the base to the integuments: if this opening, as it sometimes happens, is too small, on account of the intestine having been divided to a smaller extent than the cellular tissue and skin, the bistoury should be again introduced and the opening be enlarged to the desired extent.

After the operation is finished, the wound should be kept open by the introduction of a large tent of lint, and the parts should be covered with a few compresses, supported by a T-bandage. If there be any hemorrhage it may easily be arrested by slightly plugging the orifice of the wound.

These dressings, which should be removed as often as they become soiled, should be continued until the parts have completely healed; which frequently takes place in about three or four weeks, but sometimes not before two or three months.

ABSCESSSES OF THE ANUS.

Abscesses of the anus should always be opened early with a knife or lancet, and the incision should be made in such a manner as to divide all the skin covering the matter, in order to prevent its future lodgment. If the abscess be small, its cavity may now generally be obliterated by the use of simple dressings. If there be, however, an extensive separation of the integuments, and it happens that the rectum, although it may not have been pierced, has yet been so much denuded, that no consolidation of the sinus can be obtained, it will be necessary to lay the two cavities, viz. that of the abscess and that of the intestine, into one. For this purpose the surgeon takes a curved, probe-pointed, narrow bistoury, and introduces it into the sinus, while he has his fore-finger in the rectum. When the point of the instrument has reached the most elevated part of the sinus, it is to be pushed through the membranes as rapidly as possible, so as to divide all that is between the edge of the blade and the verge of the anus. The rest of the operation is to be conducted as in cases of fistula in ano.

FISTULA IN ANO.

If there be two openings, one in the rectum and the other in the neighbourhood of the anus, or in other words, if the fistula be complete, the two fistulous orifices should be laid into one by means of a methodical incision, which is to be made in the manner we shall presently state.

OPERATION FOR FISTULA IN ANO.

Apparatus.—The apparatus which is required in the operation for fistula in ano, consists of a long, narrow, sharp pointed, straight bistoury*, a flexible director, slightly curved and without a cul-de-sac, a wooden gorget, a pair of dissecting forceps, a porte-mèche, finely scraped lint, several long compresses, a T-bandage, and ligatures.

Position of the patient.—The patient is to be placed upon the edge of the bed on the side which corresponds to the fistula, the trunk is to be slightly flexed, and the thigh which touches the bed is to be extended, while the other is strongly flexed. The patient may also lie upon his belly, in which circumstance the legs and thighs are to be separated and left hanging over the bed.

Operation.—The operation varies according to the nature of the case. When the fistula is complete and simple, and its internal orifice is not more than two inches above the sphincter, the surgeon commences with introducing a flexible director, the extremity of which, if we use the one which is terminated in a stylet, is to be brought through the anus, by means of the index-finger passed in the rectum. The point of the bistoury is then to be introduced along the groove, which should be turned towards the anus, and all the parts are to be divided which lie between the internal opening of the fistula and the anus. In order to perform the operation in the shortest space of time imaginable, the surgeon may make the division of the parts, when the fistulous track is straight and of small extent, with the curved probe-pointed bistoury, as we have had occasion to mention in speaking of abscesses of the anus, accompanied with a denuded state of the intestine.

When the fistula is complete, and opens very high up in the rectum, we should always operate according to the method of Desault. “The surgeon having passed his left index-finger into the anus, with its palmar surface turned towards the side of the fistula, takes the grooved director into the other hand, and introduces it into the fistulous track. If the fistula be complete and its internal orifice is in the most elevated point of the denudation, the director should by all means be passed through this opening; but in cases of external or complete fistulæ, accompanied with denudation of the intestine above the internal orifice, the director should be pushed as far as this opening, and then across the attenuated parietes of the rectum, until it has arrived above the denuded place. The finger is then to be withdrawn, and the wooden gorget is to be passed through the rectum until its cul-de-sac comes into contact with the extremity of the director. The gorget is now to be held

* Considerable advantage may also be derived from the use of Baron Larrey's director, which terminates in a flexible stylet, especially when the fistulous track is sinous.

firmly by an assistant, while the surgeon introduces the long, narrow bistoury along the groove of the director, till its point meet the groove of the gorget, by cutting upon which all the parts are divided which are comprised between the internal opening and the anus." In cases in which the denudation of the rectum extends above the internal orifice of the fistula, the operation which we have just mentioned will generally be sufficient to produce a separation of the parts; but, notwithstanding this, it sometimes happens, that the insulated portion does not become united to the adjacent parts, so that the surgeon is obliged to lay it open, either with a pair of blunt-pointed scissors, guided upon the fore-finger, or with the bistoury, placed against the wooden gorget.

In case there are several fistulous orifices, and all terminate in the same sinus, and in a single perforation of the intestine, the treatment is precisely the same as in the preceding cases, with this exception, that, instead of one incision, as many should be made as there are fistulous orifices, and that if a portion of the integuments be in a diseased condition, it should be cut away with a pair of scissors, in order to prevent it from adhering to the subjacent parts.

In cases of blind intestinal fistulæ, in which there is merely an opening through the rectum, our treatment consists in laying open and dividing the sinus, and in managing the case afterwards like a complete fistula. If, however, it be impossible to discover the place which corresponds to the cul-de-sac, with which the fistula communicates inferiorly, either by the alteration of the integuments, or the employment of the means which have already been enumerated, we should have recourse to another method, which consists in introducing a large tent of lint into the rectum, with the view of producing a distention of the abscess, so as to render it prominent on the outside.

Dressing.—After the operation is finished, the surgeon should pass his finger into the rectum, and convey a tent of lint above the upper angle of the wound, and between the edges of the incision, in order to keep them from closing. The external parts are then to be covered with a pledget of simple cerate, and a few compresses, supported by a T-bandage; and if there be reason to expect hemorrhage, it should be prevented by plugging the wound.

Treatment after the operation.—The dressings to which we have just alluded, should be removed in about two or three days, and similar ones put on, which are to be continued until the wound has arrived on a level with the internal surface of the intestine. The lint should then be laid aside, and the parts should be dressed like a common suppurating wound.

Accidents.—Amongst the accidents which accompany or follow this operation, hemorrhage, either primitive, or consecutive, holds a pre-eminent rank. This may often be arrested by the introduction of a very large tent of lint, rolled in the powder of gum dragacanth; but if this be unavailing, re-

course must be had to plugging the rectum. For this purpose a large dossil of lint, tied in its middle with a double thread, should be carried above the upper angle of the wound, and the rest of the rectum should be filled with soft lint. This operation may also be performed according to the method of Desault, which consists in introducing a square piece of linen high up into the rectum, and in filling the pouch which is thus formed with dossils of lint. When this operation has been carefully performed, it generally suffices to arrest the bleeding; but sometimes this is not the case. Under this circumstance, the apparatus should be immediately removed, and, after having cleaned the intestine with injections of cold water, the surgeon should introduce a fenestrated speculum, in order to cauterize the part from which the blood issues, by means of the hot iron.

PROLAPSUS ANI.*

The principal indications which are to be fulfilled in the treatment of prolapsus ani, consist in the speedy reduction of the protruded part; in keeping it in its proper place; and in removing or avoiding the causes by which the disease has been induced.

When the disease is recent, and the tumour but moderately large, the reduction may generally be easily accomplished by placing the patient on his back, elevating his hips and shoulders, and making gentle and steady pressure with the fingers. When the efforts at reduction, however, are attended with much difficulty, and the parts are tender and inflamed, the operation should be discontinued, and recourse should be had to general and local bleeding, mild laxatives, fomentations, or cold washes, quietude, and low diet. — When the part has been reduced, a relapse should be prevented by rest and the recumbent posture, and by applying to the anus a piece of lint, covered with simple cerate, and over it a soft sponge and a T-bandage. Much benefit may also be derived by keeping the patient for a considerable time upon a low diet of rye mush and sugar, as recommended by Dr. Physick, of the University of Pennsylvania.

When the reduction is prevented in consequence of a spasmodic constriction, it will be advisable to resort to anodyne clysters and fomentations, the warm bath, and the internal use of opium. If these means be unsuccessful, and the symptoms should continue to augment, the surgeon should ascertain the situation of the stricture, and divide it either with a concealed bistoury, or a knife and director.

It sometimes happens that the protruded parts become indurated and incapable of reduction. Under these circum-

* By the translator.

stances, it may be proper to remove them, either with the knife or ligature.—Professor Dupuytren, of Paris, has lately recommended cutting away the projecting folds about the margin of the anus in cases of this disease, and relates several instances in which the operation has been attended with success. This method, however, which Dupuytren considers as novel, appears to be perfectly similar to the one suggested and practised by the late Mr. Hey.

The causes of the complaint are to be carefully avoided by the employment of the mildest laxatives, such as small quantities of *oleum ricini*; and the tone of the relaxed intestine is to be restored by the use of cold clysters, made with a decoction of oak-bark, powdered alum, and vinegar.

HEMORRHOIDAL TUMOURS.

When these tumours have become so large and numerous as to impede the discharge of the feces; when they are extremely painful and subject to considerable hemorrhage; and when they have become irreducible, and can not be benefited by the usual methods of treatment, no time should be lost in removing them with the knife.

A few days before the operation, the patient should be kept upon a low diet, drink plentifully of diluent drinks, and have his bowels opened by laxative injections.

EXCISION OF HEMORRHOIDAL TUMOURS.

The patient being placed in the same position as in the operation for fistula in ano, should be requested to strain, as at stool, in order to make the swelling more apparent. The surgeon then takes hold of the tumours with a double hook, and removes them with a bistoury or pair of forceps. If, however, they have a tendency to re-ascend immediately within the anus and drag up a fold of the mucous membrane, they should be taken hold of with a tenaculum, or, if this be impracticable, they should be brought into view, and a needle, armed with a double ligature, should be passed through the root of each tumour, and one part of this ligature should be tied firmly over one side of the swelling, and the other over the opposite side. They may also be removed by cutting away the mucous fold by which they are supported, by means of two curved incisions, made in a direction parallel to that of the intestine.

When there is reason to suppose that the removal of the fold of the mucous membrane will give rise to a stricture of the intestine, or that the spasmodic contraction of the sphincter muscle will render it difficult to introduce the necessary quantity of lint, the surgeon should by all means endeavour to obviate this occurrence by making an incision through the fibres

of this muscle and the anus. For this purpose the index finger is to be introduced into the anus, and, by means of a probe-pointed bistoury, carried up the rectum to the distance of about an inch and a half, the sphincter muscle, the skin, and cellular tissue are to be divided to the extent of about six lines.—Should there be any hemorrhage during this operation, it should be checked by the means which were pointed out in speaking of the treatment of fistula in ano.

Dressing.—The dressing apparatus consists of a large oblong tampon of lint, of moderate consistence,* of pledgets and dossils of lint, of long compresses, and a T-bandage.—When the operation is finished, the patient should be requested to make the efforts used in evacuating the feces, in order to discharge the blood which is contained in the rectum. The surgeon then takes a pair of dressing forceps, and passes the large tampon, well oiled, into the rectum, beyond the divided vessels. The lower part of the bowel is then to be filled with lint, and the wound and the anus are to be covered with pledgets of the same. The surgeon next takes the ends of the ligatures which are attached to the tampon, and ties them firmly over another tampon on the outside of the wound; after which he applies the compresses and T-bandage.

Treatment after the operation.—After the parts are dressed, the patient should be put to bed, and carefully watched for the first twenty-four hours, in order to arrest any hemorrhage as soon as it may take place. Care should also be taken to ascertain that there is no suppression of urine, in consequence of the pressure which is exerted by the apparatus upon the neck of the bladder. When this, however, is found to be the case, the urine should be immediately withdrawn by means of the catheter, which is to be left in the bladder until the plugs in the rectum are removed.

The plugs should not be removed till the fourth day after the operation, unless the contrary should be indicated. In the subsequent dressings, all that is necessary is to introduce a large tent of lint, well oiled, high up into the rectum, in order to prevent the contraction of the intestine, which would otherwise invariably take place.

* This tampon should have a long thread attached to each of its extremities.

SECTION VI.

Of the Diseases of the Extremities.

FRACTURES.

1.—*Treatment of Fractures in General.*

A.—SIMPLE FRACTURES.

Reduction.—The reduction of a fracture consists in bringing the displaced fragments into contact, and in maintaining them in their proper situation. The means employed for this purpose are chiefly three, viz: extension, which signifies the act of pulling the broken part in a direction from the trunk; counter-extension, by which is understood the act of making extension in an opposite direction, with a view of preventing the limb, or even the whole body, from being drawn along by the extending power; and coaptation, or the re-establishment of the natural relations of the bony fragments. These means should vary according to the species of the displacement; and in fact there are several cases in which extension and counter-extension are absolutely useless: of this description are fractures of the patella, where the displacement consists in a separation of the fragments, and where the reduction may be effected by putting the limb in a position in which the muscles attached to the broken bone are relaxed, and pushing the upper into contact with the lower fragment.

The extending force is usually applied to that part of the limb, which is articulated with the lower fragment, and the counter-extension to that, which is articulated with the upper. In reducing a fracture the surgeon should always remember to put the limb in such a position as will relax the most powerful muscles connected with the broken bone: the straight posture, therefore, is the one which is generally preferred; yet there are cases, as in fractures of the leg, where the half-bent state is by far the most favourable; but here the counter-extension should be applied to the upper fragment itself.

The degree of force which should be used in making extension, must vary according to the direction of the fracture, the extent of the displacement, and the number and power of the muscles concerned in producing it. The extension, however, should never be made in a sudden and violent manner; but as gradually as possible, taking the utmost care not to

shake or move the limb any more than can be avoided. When the broken limb is suddenly and violently extended, the muscles will always be excited to strong spasmodic action, that there will sometimes be danger of lacerating them, because their fibres have not sufficient time allowed them to yield to the force by which they are elongated. The extension is to begin in the direction of the lower fragment, and is to be continued in that which is natural to the limb.

As soon as the necessary extension has been made, the surgeon should endeavour to place the ends of the broken bone in their natural situation, either by simply acting upon the lower fragment, which is usually sufficient, or by applying the fingers or the palm of the hands gently and directly to the fracture itself.

Although the reduction of a fracture may generally be accomplished with tolerable ease, yet it sometimes happens that our first efforts completely fail. This is usually ascribable, either to the unequal contraction of the muscles, in consequence of severe irritation, to the improper management in making extension, or to the swelling and inflammation of the parts, which sometimes occur before the surgeon is called in. In the first case, the grand means of success is putting the limb in such a position, as will relax the most powerful muscles, which prevent the reduction; and in the second, besides putting the limb in the most favourable posture, it will be necessary to take away a large quantity of blood, and then renew our attempts at reduction. This evacuation is generally attended with the desired benefit, and is always highly advantageous in cases in which the limb is much contused and swollen, and where there is a great tendency to inflammation.

Means for keeping fractures reduced.—These means are intended to counteract the action of the muscles, which have a continual propensity to displace the ends of the fracture, and consist in an advantageous position, quietude, bandages, splints, and various kinds of apparatus. In cases of fractures of the lower extremities, the patient should lie strictly in bed, until the callus is completely formed. The bed should not be much more than a yard in width, and should be made of the same materials as the beds which are used in operating. The most favourable position for a broken limb, is that in which all the muscles, passing over the fracture, or extending either to the lower fragment, or to that part of the limb which is articulated with it, are completely relaxed. The injured limb should also be placed in such a manner as to bear throughout its whole length, equally and perpendicularly, upon the surface on which it lies, and its position ought to be regulated so that not only this object be carefully fulfilled, but that the chance of displacement from the action of the muscles, or the weight of the limb, or that of the body itself, may be diminished as much as possible. Generally speaking, the half-bent position of the limbs, is that which is the most natural, and,

consequently, the best calculated for fractures; but its employment is liable to exceptions, as will be noticed in speaking of particular fractures.

As it is of the utmost importance, in whatever position a broken limb be placed, that it should rest equally and perpendicularly throughout its whole length, great care should be taken that it be placed upon a surface, which is depressed where the limb has projections, and rises where it presents depressions. or in other words, upon a surface of precisely corresponding form. The surface should be sufficiently firm to support the weight of the limb and apparatus, but it ought not to be so hard as to annoy the patient. This indication is best fulfilled by pillows, stuffed with chaff of oats, a substance which readily admits of being pushed from the place where the member is prominent to another situation where the limb presents a depression.

With respect to the retentive bandage, it differs according to the kind of fracture, and will be spoken of in another place.

Treatment after the fracture has been reduced.—After having reduced the fracture; applied a proper apparatus for keeping the parts in their natural situation; and put the limb in a suitable position, the next thing to be done is to prevent and remove any unfavourable symptoms that may have a tendency to interrupt the formation of callus. In ordinary cases, it will be sufficient to allow the patient for the first few days, a very low diet, such as broths, tea, &c. and if he be young and vigorous, he should be freely bled, to prevent inflammation. He should be permitted to drink plentifully, and as often as he may wish, of cold, acidulated drinks; and in about seven or eight days, he should be allowed to make use of a more generous diet. Costiveness is to be averted by the use of clysters and mild aperient medicines; and all disturbance of the limb caused by the patient being obliged to move himself, after taking a purgative, is to be carefully avoided by means of a bed-pan.

Surgeons are also in the habit, during the first few days, of wetting the bandage with water, a solution of the acetate of lead, or an infusion of elder leaves, &c. with a view of lessening the tendency to inflammation and swelling; but in doing this, great care should be taken not to apply the bandage too tightly, because it always shrinks when wet, and may become so tight as to do harm.

When a fracture is well set, the position of the part right, and the apparatus neither too tight, nor too slack, the less the broken bone is moved the better. Sometimes, however, the surgeon is obliged to take off the splints and undo the bandage, in order to ascertain that the ends of the fragments lie in even apposition: this precaution should always be early attended to, especially when there is severe contusion of the soft parts. The examination should always be made without moving the

limb: hence, the reason for employing the eighteen-tailed bandage, which enables the practitioner to open the parts without disturbing the limb, or even lifting it from the surface upon which it has been placed.

In cases of oblique fractures of the thigh, the difficulty of accomplishing by the ordinary means a cure free from deformity, has induced practitioners to resort to the employment of continual extension. This expression implies the operation of an apparatus, which counteracts the contractile efforts of the muscles, restrains the fragments of the broken bone from gliding over each other, and maintains them in contact during the whole time requisite for their union. Whatever may be the nature of the bandages or apparatus, which are employed for this purpose, it should always be remembered, in the first place, that they ought never to be applied in such a manner as to compress the muscles which pass over the situation of the fracture, and the elongation of which is necessary to restore to the limb the length which it has lost by the gliding of the fragments over each other; secondly, that the extending force be divided upon as large a surface as possible; thirdly, that they act in the direction of the axis of the fractured bone, in a slow, gradual, and continued manner; and fourthly, that the pressure which they exert upon the parts, be equally diffused through the whole limb.

In the treatment of fractures, the limb should always be kept perfectly motionless, not only until the callus has acquired a sufficient degree of solidity, which usually takes place in about thirty days, but also for some time after. The apparatus, in fact, should not be removed until the ends of the fragments have become perfectly consolidated, and, even after the splints have been taken off, the patient should not be allowed to get out of bed, or bear upon the limb, till several days more have elapsed.

After the cure of a fracture, however simple it may have been, the patient always experiences a stiffness in the injured limb, which varies according to the situation of the fracture, and the means which are employed for retaining the parts in their natural situation. This inconvenience may generally be removed by frictions, emollient applications, and the shower-bath.

Formation of Callus.—The time which is required for the consolidation of a fracture varies according to the age, constitution and health of the patient, and according to the thickness of the bone, the weight which it has to support, and the season of the year. The vulgar opinion, therefore, which has fixed the consolidation of a fracture at forty days, is perfectly absurd and ill founded. It is true, indeed, in the most simple kinds of fractures, the process of ossification is accomplished between the twentieth and thirtieth, and especially between the thirtieth and fiftieth days, but this is by no means always the case; and instead of regarding the patient as perfectly cured,

our care to keep the ends of the fragments in apposition and perfectly at rest, should be redoubled, in order to enable them to become firmly united. As a general rule, it may be stated, that fractures are consolidated with more ease and quickness in young and vigorous subjects, than in the aged and infirm, and in the small than in the large bones. It is also necessary, in order to obtain a firm callus, without deformity, 1st, That the two fragments be possessed of sufficient vascularity; 2ndly, That the surfaces of the fracture be in exact apposition; and 3rdly, That they be kept in a completely motionless state.

When the time which is required for a broken bone to become firmly united has elapsed, it is proper to examine the parts to ascertain whether the callus has acquired a sufficient degree of solidity to allow the apparatus to be removed. For this purpose two assistants should be requested to hold the limb, and while they endeavour to bend it, the surgeon should carefully and cautiously examine the place of the fracture; and if it be found to bend in the least at the injured part, the callus is not sufficiently strong, and the limb should be immediately replaced in the apparatus.

B.—COMPLICATED FRACTURES.

When a fracture is complicated with a dislocation, the latter, if possible, should always be reduced before the former is set. When the reduction of the luxation, however, is attended with extreme difficulty, the fracture should be first attended to, and after it has become firmly united, an attempt may be made to rectify the dislocation, though this, it must be confessed, seldom succeeds.

In cases of complicated fractures, it is always a matter of the first importance, to determine whether the preservation of the limb can with safety be attempted, or whether amputation will not be the only means likely to save the life of the patient. When the bone is shattered in different places, and this to a considerable extent; when the skin, muscles and tendons are so much torn, lacerated, and destroyed, as to render mortification the most probable consequence; and when the articular extremities of the bones are crushed, and the ligaments connecting them are torn, or otherwise injured, amputation should be performed without the least delay. For, although experience has proved that patients under these circumstances may sometimes recover, yet they almost invariably die, and the small number that get well, generally purchase their cure at the enormous price of long and reiterated sufferings.

When the injury, however, is not of such a nature as to render amputation necessary, the next consideration is the reduction of the fracture. If the fracture be of the transverse kind, and the wound large, a moderate degree of extension will generally easily reduce it, but if the fracture be oblique, and

passes through the soft parts, it will be necessary to put the limb in a bent position, or even to enlarge the wound. If the bone be broken into several pieces and any of them be detached from the body of the bone, they should be extracted with all possible gentleness, without the least pain, violence, or laceration. If the extremities of the fractured bone have wounded and irritated the surrounding parts, they should also be removed, provided the operation will not be attended with too much irritation; in which circumstance it will be better to leave the parts undisturbed.

After the fracture has been reduced, the wound dilated and the splinters extracted, the next thing to be done is to apply the dressings. In complicated fractures, the dressings which are required are of two kinds, viz. that for the wound, and that for the limb. But as we have already had occasion to speak of the former in the article on complicated wounds, we shall at present merely occupy our time in describing the dressing, which is necessary for keeping the fragments in contact.

The bandage best calculated for complicated fractures is what is commonly called the eighteen-tailed bandage, which admits, as we have already stated, of being opened without disturbing the limb, and enables the surgeon to renew any of the pieces that may have become soiled. In these cases, however, it is not necessary, and in fact it may even be injurious, to employ the splints which are used in cases of simple fractures.

The posture of the limb is of the utmost importance, and should be so regulated as to maintain the bony fragments in even contact, and put the muscles in such a disposition as is most suitable to their lacerated and wounded state.

In complicated fractures of the leg, it not unfrequently happens that the soft parts about the ankle are so much contused or otherwise injured as to render it impossible to employ the usual extending bands. When this is found to be the case, the difficulty may usually be remedied by applying along each side of the leg, as high up as the seat of the fracture will admit, a piece of strong muslin, about two feet in length and two inches and a half in width, and spread at one of its extremities with adhesive plaster. The part which is applied upon the limb should be confined by three or four short circular strips, so as to keep it firmly in its place and equalize the extending power. The free extremities of the extending bands should then be tied under the sole of the foot, and be secured to the block or bar which connects the lower ends of the splints. This mode of making extension, for which the profession is indebted to the ingenuity of my excellent preceptor, Dr. Swift, of Easton, Pa. will, I am fully persuaded, be found highly useful in practice, and satisfactorily obviate the inconveniences to which we have just alluded.

C.—UNCONSOLIDATED FRACTURES.

If, after the necessary time for the union of the fracture has expired, the callus is not yet firm, we should carefully examine the causes which may have retarded its consolidation. This

circumstance may be owing, either to a peculiarity of disposition, to a debilitated state of the patient, or to a general or local scorbutic condition of the system. When this is found to be the case, immediate recourse should be had to discutient applications, such as the acetate of lead, or camphorated alcohol, and to the administration of tonic and stimulating medicines; at the same time that the patient be confined in a well ventilated apartment, and the limb be daily exposed to the contact of the air and heat of the sun, or be rubbed with flannels, dipped in a decoction of aromatic substances.

When a fracture remains disunited, it gives rise to what is called a false joint. This deformity may sometimes be remedied by continuing the application of the proper apparatus for a considerable time longer, or by making an incision through the integuments directly over the situation of the fracture, and then putting the ends of the fragments in even contact. But, as these means generally fail, we are obliged to have recourse to one of the following methods, which, although they are by no means free from danger, may, nevertheless, be put in practice when the limb is disabled from performing its functions, and the patient is willing rather to run the risk of the operation, than to retain his infirmity. The first of these operations which we shall mention, is the one which was originally suggested and put in practice by Mr. White. This method, which has been adopted by a number of practitioners, consists in making a longitudinal incision, opposite to the principal vessels and nerves, through the integuments which cover the fracture, in cutting away or rasping the ends of the fragments, and then treating the limb as if the case were a recent compound fracture. The other method, which was first suggested and successfully adopted by Dr. Physick, of Philadelphia, and by Baron Percy, consists in introducing a seton through the preternatural joint, with a view of exciting inflammation, and bringing about a union between the ends of the broken bone. In performing this operation the limb should be slightly extended, in order that the seton may be introduced, as much as possible, between the ends of the bone. When the operation is finished, the limb should be again extended, and the proper apparatus applied; and when the parts have become perfectly consolidated, the seton should be removed.

Dr. Physick's operation was first performed on the 18th of December, 1802. It has since been repeated by Brodie and Bell, of London, by Mr. Stansfield, of Leeds, by Dr. J. R. Barton of Philadelphia, and by a number of other surgeons. Like every other great improvement in surgery, however, it has sometimes failed.

A very ingenious operation has lately been suggested and successfully practised by Dr. J. R. Barton, one of the surgeons and clinical lecturers of the Pennsylvania Hospital, for the relief of certain species of ankylosis. The patient, a sailor, aged twenty-one, had lost the use of his hip-joint in consequence of an injury which he had received from a severe fall. The thigh was drawn up nearly to a right angle with the axis of the pelvis, and the knee turned inwards, and projected over the sound thigh, so that the outside of

the foot presented forwards. In this condition the patient was admitted into the Hospital, where various attempts were made to correct the malposition of his limb, but to no purpose. After much reflection upon the case, Dr. Barton was led to conclude that an artificial joint might possibly be formed by making a large incision through the soft parts, and then sawing through the lower part of the neck of the os femoris, a little above its root. Accordingly, on the 22nd of November, 1826, assisted by Drs. Parrish and Hewson, Dr. Barton proceeded to the operation, in the presence of a large class of medical students, and a number of respectable physicians. Having made a large crucial incision through the integuments and fascia, covering the most prominent part of the trochanter major, and raised the flaps, he cautiously detached the muscles in contact with this part of the bone, and thus made a passage sufficiently large to admit of the easy introduction of the fore-fingers, before and behind the bone. Having done this, he divided the bone transversely through the trochanter major, and part of the cervix femoris, by means of a strong, narrow saw, constructed for the purpose; and, as soon as the thigh was released, the knee was turned out, the leg extended, and the limbs placed side by side, in order to ascertain their comparative lengths.* The bleeding was so trifling that not a single vessel required to be secured. When the operation was finished, the edges of the wound were brought into contact, and kept in this position by strips of adhesive plaster and light dressings. The patient was then put to bed, and his limb supported by means of Desault's fracture-apparatus. The operation was extremely severe, and was accomplished in about seven minutes.

In about twenty days after the operation, the limb was gently and cautiously moved in the directions of the natural movements of the sound hip-joint; but great care was taken not to continue it so long, or to repeat it so frequently, as to produce severe irritation. In this manner the limb was moved as often as the state of the parts would permit, at first at intervals of several days, and afterwards daily. The wound was completely healed in about sixty days; the inflammation had entirely subsided, and the patient was able, with proper assistance, to leave his bed. From this time he gradually recovered the use of his limb, and in about four months after the operation, the artificial joint had acquired such a degree of motion that he was able to walk about with merely the aid of a cane.

"Having now established the fact," says Dr. Barton, "that an artificial joint can be substituted for the loss of the natural articulation at the hip, it becomes a matter of importance to ascertain how far the same principles are applicable to the formation of new joints in other parts of the body, when natural motion has been lost. My reflections on this point have not presented any forbidding circumstances; but it is not in every joint that the loss of motion would be sufficiently important to call for the aid of a painful operation. The most serious evil is sustained by the loss of the hip, knee, shoulder, elbow, great toe, and finger joints, and of the lower jaw; and these, I believe, may all come within the reach of amendment by an operation, if the muscles which move these respective joints, are in a sound and efficient state. If they have been lost, it would be palpably wrong to form a joint, since its unrestrained motion would be more troublesome than a rigid limb. A transverse section of the bones would be proper, if the operation were to be attempted at the shoulder, knee, fingers, or toes; but an angular division would be necessary at the elbow, in order to preserve some resemblance to the natural joint at this part."

Dr. Barton, however, does not recommend this operation as applicable to every case of ankylosis, but expressly states, that he believes it "justifiable only under the following circumstances, viz. where the patient's general health is good, and his constitution is sufficiently strong; where the rigidity

* It was found that the distorted limb was about half an inch shorter than the other.

is not confined to the soft parts, but is actually occasioned by a consolidation of the joint; where all the muscles and tendons that were essential to the ordinary movements of the former joint are sound, and not incorporated by firm adhesions with the adjacent structure; where the disease, causing the deformity, has entirely subsided; where the operation can be performed through the original point of motion, or so near to it, that the use of most of the tendons and muscles will not be lost; and finally, where the deformity or inconvenience is such, as will induce the patient to endure the pain, and run the risk of an operation."—*See Dr. Barton's Paper in the North American Medical and Surgical Journal, April 1827.*

II.—TREATMENT OF PARTICULAR FRACTURES.

Fractures of the Scapula.

In fractures of the body of the scapula, whatever may be their direction, it is merely necessary to fix the arm to the side by means of a bandage, which includes the arm and trunk from the shoulder to the elbow, and is prevented from excoriating the skin by the intervention of proper compresses.—When the inferior angle is broken, and drawn downwards and forwards by the serratus major articus, the scapula is to be depressed and pushed towards the fragment, by carrying the arm inwards and forwards, where it is to be kept against the side by a long roller.—In fractures of the acromion, the arm must be raised in such a manner, that the head of the os humeri shall push up the acromion, while an assistant pushes the scapula forwards and downwards, in a contrary direction to that of the arm, and thus enables the fragments to be brought in even contact. The parts are to be kept in apposition by means of a circular bandage, which is to be applied round the arm and body, and over the injured shoulder. This bandage should be frequently re-applied, and be worn for about fifty days.

FRACTURES OF THE CLAVICLE.

Reduction.—The observations which we shall make on the present occasion, concerning the manner of reducing and keeping in contact fractures of the clavicle, are only applicable to the oblique fractures of the body of the bone: in the others it is merely necessary to keep the arm firmly fixed against the side by means of a bandage, which includes the arm and trunk.—The patient being seated upon a stool or the edge of his bed, the surgeon places one hand under the axilla and carries the upper part of the arm outwards and backwards, while with the other hand applied to the elbow, he pushes it inwards, forwards, and upwards.

Retentive means.—It is a well-known fact, that a fracture of the clavicle may be more readily reduced than kept in con-

tact. Amongst the numerous contrivances that have been devised for this purpose, two only appear to be worthy of our approbation: the one is the bandage of Desault, simplified; and the other the apparatus of Professor Boyer, which has but one disadvantage, and that is, that it can not be always readily obtained. It is preferable, however, to that of Desault, especially in those persons who are unable to bear much pressure round their chest, and in whom it is important to avoid the deformity which this fracture not unfrequently occasions.

I.—BOYER'S APPARATUS.

The apparatus of Professor Boyer consists "of a girdle of quilted cloth, about five inches in width, which passes round the trunk on a level with the elbow, and is secured by means of three straps, and as many buckles. On the lower part of the arm is to be laced a piece of cloth, also quilted, four or five inches broad. Four straps are attached to it, two before and two behind the arm, which correspond to the buckles on the outside of the girdle, and serve to keep the arm close to the trunk, while the cushion which is applied under the axilla, pushes the upper part of the arm and scapula outwards. By tightening the anterior straps, the elbow is brought more or less forwards. The weight of the limb is to be supported by means of a sling, which includes the fore-arm, the hand and the elbow, and is fixed to the sound shoulder."

II.—DESAULT'S BANDAGE, MODIFIED.

Apparatus.—1. A cushion or pillow, filled with hair or chaff, three or four inches thick at one of its ends, terminating at the other in a narrow point, and long enough to reach from the axilla nearly to the elbow. 2. A compress of fine linen, spread with simple cerate, and large enough to cover the cushion. 3. A single-headed roller, nine yards long, and about four inches wide.

Application.—The patient being placed in the same posture as in reducing the fracture, the surgeon extends the arm on the affected side, places it perpendicularly along the trunk, and requests an assistant to hold it at the wrist. The cushion is then to be applied under the axilla, with its base upwards, and kept in this position by an assistant, who stands on the opposite side, and applies the extremity of each hand to the anterior and posterior edges of the cushion, by passing one arm over the breast of the patient, and the other behind. The end of the roller is now to be pinned to the cushion, which is to be firmly fixed round the trunk by several turns of the bandage. Having done this, and bent the fore-arm to a right angle, the roller is to be given to another assistant,

while the surgeon takes hold of the patient's elbow, and carries it forwards, upwards, and inwards, so as to press it forcibly against the breast. An assistant is to support the arm in this position, while the surgeon makes several turns round the lower part of the arm and trunk, and secures them with a few pins. He next carries it obliquely over the sound shoulder, across the back, passes it under the elbow of the affected side, and brings it in front, so as to pass again over the sound shoulder. This plan is to be repeated, until the arm and shoulder are firmly fixed; after which the rest of the roller is to be carried round the trunk, commencing near the elbow, and reaching as high as the middle of the arm. The apparatus is then to be secured by pins, wherever they promise to be useful, and the patient's hand is to be kept in a sling.

This bandage, when properly applied, answers every purpose for keeping the ends of the fracture in contact, as has been exemplified in the practice of Professor Dupuytren. Like that of Desault, however, it is liable to become easily relaxed, and to excoriate the parts; but these inconveniences may be readily remedied by re-applying the bandage whenever it becomes deranged, and by covering the parts of the skin, which are most firmly compressed, with compresses of simple cerate.

A bandage for fractures of the clavicle, somewhat similar to that of Desault, has lately been recommended by Dr. Brown, of New York, and is applied in the following manner. The surgeon taking a single-headed roller, about eleven yards in length, and three inches and a half in width, places its end near the axilla of the sound side, and secures it there by several circular turns round the upper part of the chest. A triangular pad is then to be placed under the axilla, and fastened to the opposite shoulder, by means of two pieces of tape. Having done this, the surgeon reduces the fracture upon the same principles as in the preceding case, and while an assistant supports the fore-arm, bent to a little less than a right angle, he brings the roller obliquely down across the breast, nearly over the middle of the back, to the lower part of the scapula of the opposite side, from whence it is to be again carried over the breast and fore-arm, as already stated.—Having repeated this plan four or five times, with the precaution of letting each turn overlap about two-thirds of the other, and bringing it nearer to the elbow, so as to form a proper support for it, the remainder of the bandage is to be passed round the body and arms, in order to keep the lower extremity of the humerus closely applied to the trunk. The apparatus is then to be secured by pins or stitches, and the patient's hand is to be supported in a sling.

Before applying the bandage, a large compress should be placed upon the shoulder and fore-arm, to prevent excoriation.—This apparatus is extremely simple, and can be much easier applied by the generality of practitioners, than that of Desault; but whether it will be found equally useful, experience, I believe, has not yet fully determined. I should certainly, however, think it entitled to our confidence, and as such it deserves to be fairly tried.

FRACTURES OF THE HUMERUS.

Reduction.—In fractures of the body of the os humeri, the shoulder is to be firmly fixed by an assistant, who stands

on the sound side, while another, who is placed on the opposite side, makes the necessary extension by bending the elbow, and drawing the lower portion of the bone downwards. The surgeon then brings the ends of the fragments in even contact, by means of gentle and cautious pressure.

In fractures of the neck of the os humeri,* the patient is to be seated upon a chair, or the edge of the bed, while the surgeon separates the arm from the trunk, and carries it slightly forwards, at the same time that an assistant fixes the chest by pulling at the sound arm. Another assistant makes the necessary extension upon the fore-arm, which is to be half-bent, and used as a lever of the third kind by fixing the wrist, which represents the fulcrum, with one hand, while the other, which represents the power, is to be applied to the middle and anterior part of the fore-arm, so as to pull the limb from above downwards.

Retentive means.—When the fracture is seated in the body of the humerus, the ends of the fragments are to be kept in contact by means of the bandage which we shall now proceed to notice.

BANDAGE FOR FRACTURES OF THE HUMERUS.

Apparatus.—1. A single-headed roller, three inches wide and nine yards in length. 2. A soft compress, long enough to make one turn and a half round the fractured part. 3. Four splints, a little shorter than the arm, and not so wide as to touch at their edges. 4. Scraped lint, or cotton, to fill up the depressions between the splints and the arm.

Application.—Having effected the reduction, the assistants are to continue the extension, while the surgeon takes the roller, and commences with applying it round the hand and fore-arm, in order to prevent them from becoming swollen and œdematous. For this purpose he makes a few turns round the fingers, and after having filled the hollow of the hand with a sufficient quantity of cotton, he carries the bandage moderately tight round the arm upwards, making each turn overlap two-thirds of that which is immediately below it. When the roller has reached the elbow, the surgeon should carefully ascertain that the arm has recovered its natural form and length, and that the external tuberosity of the humerus is upon the same line as the most prominent portion of the anterior part of the shoulder. The bandage is then to be rolled moderately tight as far as the upper part of the arm, taking care

* In surgical language the neck of the humerus implies that contracted part, which is situated between the tuberosities of the head of the bone, and the points of insertion of the pectoralis major, and the latissimus dorsi and teres major muscles; while, in anatomical language, the neck of the bone means that small depression which separates the head from the tuberosities of this bone.—S. D. G.

not to forget to apply the compress, which is to be previously moistened, over the situation of the fracture, and to fill the depression which corresponds to the insertion of the deltoid, in order to obtain a perfectly uniform pressure. The roller is now to be committed to the care of an assistant, while the surgeon applies the splints, well covered with compresses, to the extremities of the transverse and antero-posterior diameters of the arm. These parts of the apparatus are to be held by an assistant, who applies his hands near the bend of the arm, so as not to obstruct the application of the remainder of the bandage. Having done this, the surgeon again takes the roller, and applies it over the splints with moderate tightness until it is exhausted.

When the apparatus is applied, the patient should be confined to his bed for several days, and when he is in a proper condition to get up, his fore-arm should be supported in a sling.

The dressings should be reapplied about once a week, for nearly a month, and in about forty or fifty days they may be entirely removed.

In fractures of the lower end of the os humeri, it will be advisable, after having covered the limb from the ends of the fingers to the shoulder with a proper bandage, to adopt the advice of M. Boyer, which consists in bending the fore-arm to a right angle, and in placing two thick paste-board splints, previously moistened, along the entire length of the limb. These splints, one of which is to be applied in front and the other on the back of the arm, should be flexible at their middle, and be secured by means of the remainder of the roller, which is to be passed over them with moderate tightness.

When the fracture is seated in the neck of the humerus, it will be necessary to apply the apparatus which has been recommended by Desault.

DESAULT'S APPARATUS FOR FRACTURES OF THE NECK OF THE HUMERUS.

Apparatus.—1. Two rollers, the one about ten yards in length, and the other six, and each three inches wide. 2. Three strong splints, of different lengths, and about two inches broad. 3. A cushion or pillow, three or four inches thick at one of its ends, terminating at the other in a narrow point, and long enough to extend from the axilla to the elbow. 4. A sling to support the fore-arm. 5. A towel to cover the whole apparatus.

Application.—Having effected the reduction of the fracture, the assistants are to continue the extension, while the surgeon takes the first roller, and fixes one of its heads by applying two circular turns round the upper part of the fore-arm. The bandage is then to be rolled moderately tight round the arm upwards, taking care to make each turn overlap two-thirds of

that which is immediately below it. When the roller has reached the upper part of the limb, it must be doubled back a few times, in order to prevent the folds which the inequality of the part would otherwise create. The bandage is afterwards to be carried twice under the opposite axilla, and the rest of it is to be brought up to the top of the shoulder, and given to an assistant. The first splint is to be placed in front, reaching from the bend of the arm as high as the acromion process of the scapula. The second, on the outside, from the external condyle to the same height; and the third, behind, extending from the olecranon to the margin of the axilla. These parts of the apparatus are to be held by an assistant, by applying his hands near the bend of the arm, so as not to obstruct the application of the remainder of the bandage.

The surgeon then takes the roller again, and applies it over the splints with moderate tightness, and terminates at the upper part of the fore-arm, where he began. While the assistants still keep up the extension, the surgeon takes the pillow, and places it between the arm and trunk, taking care to put the thick end upwards, if the bone be displaced inwards, but downwards, if this, as it most commonly happens, should be displaced outwards. The pillow is then to be secured with two pins to the upper part of the roller. The arm is next to be brought near the trunk, and fixed upon the pillow by means of the second roller, applied round the arm and thorax. The turns of this bandage should be rather tight below, and slack above, if the fracture be displaced inwards, and vice versâ.

The fore-arm is to be supported in a sling, and the whole apparatus is to be covered with a towel.

Professor Richerand, instead of using this bandage, which is always attended with considerable trouble, contents himself with applying the arm firmly against the thorax, and maintaining it in this position by means of a large sling, which includes at once the arm, the fore-arm and the shoulder.

FRACTURES OF THE FORE-ARM.

Reduction.—The reduction of fractures of the fore-arm varies according to the nature and seat of the injury.—When there is a fracture of both bones, the patient is to be seated upon a chair, and the fore-arm is to be flexed, and the hand placed in a position between pronation and supination. An assistant then takes hold of the patient's hand, and extends the fractured parts, while another assistant makes the necessary counter-extension, by fixing the humerus with both his hands. The surgeon, standing on the outside of the limb, makes gentle and gradual pressure on the anterior and posterior sides of the fore-arm, and thus restores the bones to their natural situation, by pushing the muscles into the interosseous space. As soon as

the fracture is reduced, the surgeon proceeds to the application of the apparatus.—When the radius is alone broken, all that is necessary is to make extension and incline the hand towards the ulnar side of the fore-arm. If, on the contrary, there be a fracture of the ulna, the hand should be inclined towards the radial side of the arm, while the surgeon compresses the muscles in the interosseous space, in order to push the radius outwards, which, in this case, is always slightly displaced towards the ulna.

Retentive means.—When the fracture is seated in one or both bones of the fore-arm, the following bandage is generally sufficient to keep the ends of the fragments in apposition, except when the fracture is complicated, in which circumstance the bandage of Scultetus is preferable.

BANDAGE FOR FRACTURES OF THE FORE-ARM.

Apparatus.—1. A single-headed roller, about six yards long, and two inches and a half wide. 2. Two graduated, narrow, prismatic compresses, a little shorter than the bones of the fore-arm, and varying in depth according to the thickness of the arm, increasing as the diameter of the arm diminishes. 3. Two wooden splints, long enough to reach, the one from the bend of the arm to the palm of the hand, and the other from the olecranon to the dorsal surface of the metacarpus.

Application.—Having effected the reduction of the bones, the surgeon applies the graduated compresses, previously soaked in some discutient lotion, along the anterior and posterior sides of the fore-arm. Over these compresses are to be placed two splints, well covered with wetted linen; and the whole is to be secured by means of a roller, which is to be carried to the hand by circles placed partially over one another: when it has reached the hand, it is to be enveloped by passing the bandage between the thumb and index-finger. The fore-arm is then to be bent to a right angle with the arm, and the hand placed in a position mid-way between pronation and supination.

If the fracture be simple, and the injury of the soft parts inconsiderable, the patient need not be confined to his bed; but may walk about with his arm in a sling.

The apparatus should at first be applied only moderately tight, and should be renewed about every ten or fifteen days, until the parts have become perfectly consolidated, which usually happens between the thirtieth and fortieth day.

The apparatus for fractures of the radius or ulna is the same as the preceding, excepting that it is necessary to keep the hand in a state of adduction or abduction, according to the circumstances of the case.

In fractures of the olecranon, it is sufficient, in order to effect a reduction, to push the retracted portion of the bone downwards, and to keep it in this position, at the same time

that the ulna is made to meet it, by extending the fore-arm. The two ends are afterwards to be maintained in apposition by means of the following apparatus.

BANDAGE FOR FRACTURES OF THE OLECRANON.

Apparatus—1. A strong splint, long enough to cover a part of the arm and fore-arm, and slightly bent on a level with the humero-ulnar articulation. 2. A single-headed roller, about six yards long and two inches and a half wide. 3. A few compresses.

Application.—The limb being held by two assistants in a half-bent position, the surgeon is to begin applying a roller round the hand, and to continue as high up as the elbow, in order to efface the wrinkles of the skin. The olecranon is then to be pushed towards the ulna, and is to be confined in this situation with a few turns of a roller, with which the joint is then to be covered, by applying it in the form of a figure-of-eight, as in bleeding at the arm. Having thus completely covered the elbow, the bandage is to be continued as far as the upper part of the limb. The splint is now to be laid along the arm and fore-arm, and fixed by the remainder of the bandage. The limb is then to be placed evenly upon a pillow.

Although the olecranon generally unites in about ten or twenty days, it will be proper to keep on the apparatus for about a month, and to begin to make passive motion, in order to prevent ankylosis. In about forty or fifty days the cure is completed.

FRACTURES OF THE BONES OF THE HAND.

In cases of simple fractures of the bones of the metacarpus, it will be necessary, after having effected a reduction, to fill the hollow of the hand with cotton or lint, and apply a roller from the base of the fingers to the wrist. Two splints are then to be applied, one anteriorly and the other posteriorly, and fixed by a few turns of the bandage. If the fracture be displaced in a lateral direction, the fragments are to be kept separated by placing a graduated compress in each interosseous space, on either side of the hand, and over these is to be laid a splint, fixed by means of a roller.

When there is a simple fracture of one or more of the phalanges, the surgeon makes a few turns round the hand by passing the bandage between the thumb and index-finger, and then applies two or four splints, which are to be fixed by the rest of the roller. Having done this, the other fingers are to be brought near the one which is fractured, and secured by a few circular turns of a bandage.

As fractures of the hand are usually complicated with contusion, or severe injury of the bones and soft parts, the reader

is requested, for a farther account of the treatment of these cases, to consult the article on complicated wounds and fractures.

FRACTURES OF THE THIGH.

A.—Fractures of the Body of the Os Femoris.

Reduction.—Before proceeding to the reduction, the patient should be placed upon a firm bed, and every thing belonging to the apparatus should be prepared. Having done this, two assistants are requested to raise the fractured limb, by taking hold of the pelvis and leg, in order to enable the surgeon to apply the apparatus. After a moment's repose, and while the limb is held in a horizontal position, a strong assistant should be desired to steady the pelvis, by applying his two hands upon the anterior iliac spines, while another assistant grasps the foot, and makes the necessary extension, by pulling gently and gradually at first in the direction of the lower fragment, and afterwards in that of the limb, taking care, if the thigh-bone has been rotated, either inwards or outwards, to bring it to its natural direction, by an opposite movement; at the same time that the surgeon, standing on the outside of the limb, reduces the fragments by a gentle and graduated pressure round the fracture.

Retentive means.—Having reduced the fracture, the assistants are to continue the extension and counter-extension, while the surgeon proceeds to the application of the following apparatus, which is always sufficient to keep the ends of the fragments in contact, except in cases of comminuted and very oblique fractures, attended with considerable displacement, in which the apparatus for making permanent extension is preferable.

APPARATUS FOR FRACTURES OF THE BODY OF THE OS FEMORIS.

1. A piece of cloth, a little longer than the limb, and wide enough to be wrapped three or four times round each splint.
2. Scultetus's bandage.
3. Several compresses, long enough to cover three-fourths of the circumference of the limb.
4. Three splints, the first of which is to extend from the os ilium to a certain length beyond the sole of the foot; the second from the tuberosity of the ischium to the same distance; and the third from the groin to near the top of the ankle-joint.
5. Three bolsters, filled with oat-chaff, and a little longer than the splints.
6. Five or six pieces of tape, to keep the apparatus in its proper place.
7. A cushion or pillow, long enough to reach from the groin to the foot, and so wide that when the limb is placed upon it, it can not slip over it.

Preparatory measures.—Previously to the reduction of the fracture, care should be taken to arrange the apparatus upon a table. For this purpose the pieces of tape should be laid across a large pillow at equal distances from each other, and be covered with the splint-cloth. About three inches from the upper edge of the splint-cloth is to be laid the first and longest strip of the bandage of Scultetus; the second is to overlap the lower half of the first, and the others are to be arranged in the same manner, and in regular succession, until a sufficient number has been laid down to cover the whole thigh. The two long splints are now to be laid along the lateral edges of the splint-cloth and the extremity of the bandage of Scultetus, and are to be rolled up so as to leave merely a sufficient space for the interposition of the bags of chaff, which are then to be applied, and serve to prevent the splints from irritating the limb.

Application.—The limb being now elevated by proper assistants, the apparatus is to be glided beneath it, by means of the pillow. The fracture is then to be reduced in the manner already stated, and while the extension is continued, the surgeon is to apply a wet compress over the situation of the injury, and then proceed to the application of the bandage of Scultetus, by commencing at the strip nearest the knee or the one last laid down. The ends of this are brought over the front of the thigh and crossed; the second strip secures the first, the third the second, and so on until the whole thigh is covered, when the last strip or the one nearest the hip is secured with a pin.* The long splints are then to be rolled in the splint-cloth, and brought along side the limb; care being taken to leave a space of about two inches for the interposition of the bags of chaff, which are next to be applied in such a manner as to make even and uniform pressure throughout the whole extent of the limb. The other bag and the short splint are then to be applied over the front of the thigh; and while an assistant holds the apparatus with both his hands and brings the splints together, the surgeon ties the tapes by commencing at those which are nearest the fracture. A handkerchief being now passed under the foot, its extremities crossed and secured to the lower end of each splint, the operation is finished by placing a frame over the limb, in order to support the coverings of the bed.

This apparatus, which fulfils every indication, and which is at present almost universally employed in France, is reprobated by the English surgeons, who prefer either the method of Mr. Pott, which consists chiefly in placing the limb in a middle state between perfect flexion and extension and in letting it rest on the great trochanter; in inclining the patient's whole

* Whatever may be the part upon which this bandage is applied, the manner of proceeding is always the same, excepting at the leg, where the first strips are to be passed round the foot and ankle so as to form a figure-of-eight.

body to the same side; and in raising the leg and foot rather higher in their level than the thigh; or the plan suggested by Mr. Charles Bell, which consists in confining the patient upon his back, with his limb supported in the bent posture by means of a wooden frame, constructed on the principle of a double inclined plane. This machine consists of two large splints or boards, ten or eleven inches in breadth, one extending from the heel to the ham, the other from the ham to the tuberosity of the ischium. Under the knee-joint, they are united at an angle, while their lower ends are connected together by means of a horizontal board. The two sloping surfaces thus formed are to be covered with cushions, and over these the limb is to be placed in an easy bent attitude. After the bone has been reduced, the compresses and bandages are to be applied as in the foregoing apparatus, and a long splint is to be placed from the hip to the side of the knee, and another along the inside of the thigh.

The method of Mr. Bell is particularly useful in cases of fractures near the condyles of the os femoris, as well as in comminuted fractures, especially with the modifications which have been suggested by Sauter, which consist in suspending the apparatus and limb by means of a rope, which is attached to the point of union of the two oblique boards and to each angle at their lower end, and is fastened to another rope which glides over a pulley at the top or bottom of the bed.

Another method, which is in some measure a modification of those of Pott and Bell, has lately been successfully employed by Professor Dupuytren. It consists in making two inclined planes, by means of firm cushions, over which the leg is to be placed in an easy bent position, and in such a manner that the pelvis shall rest but imperfectly upon the bed. Two loops, made by means of two sheets, folded like a cravat, are then to be attached by one of their extremities to one of the lateral bars of the bed directly opposite to, and the one a little above, and the other below, the knee. The upper loop is afterwards to be carried obliquely towards the leg, and after having crossed it, it is to be fixed to the opposite side of the bed, so as to describe a kind of semi-circle, the convexity of which is to look towards the patient's foot. The lower loop is then passed obliquely in an opposite direction, crosses the end of the first, describes a curve in front of the thigh, and is attached below the preceding, the extremity of which it also crosses.—Professor Delpech, of Montpellier, with a similar view, has devised an apparatus called the inclined desk plane, the two moveable pieces of which may be more or less inclined, and enable the surgeon to extend or flex at pleasure the leg and thigh in different degrees, and to make permanent extension upon the limb. This apparatus possesses great advantages over the others, even over that of Dupuytren. It must be confessed, however, that the latter is preferable in persons who are not refractory, and in cases of transverse fractures, espe-

cially on account of its extreme simplicity, and the facility with which it may always be obtained. At the same time, however, it is less apt to maintain the ends of the fracture in apposition; but this inconvenience may be readily remedied, by restoring the fragments to their natural situation, as often as they become displaced, by means of a gentle and graduated pressure upon the sides of the limb.

Treatment after the reduction.—It is not until about the sixteenth day that the apparatus should be disturbed, in order to tighten the small bandages. It should be carefully examined, however, every morning, and, if it has become relaxed, it will be necessary to tighten the tapes. The dressings should be made about once a week until the thirtieth day; after which it will suffice to renew the apparatus every ten days until the fiftieth or sixtieth. It sometimes happens that the fragments glide over each other, and the limb becomes shortened, although the apparatus may have been ever so well applied. In this case, it will be necessary to have recourse to the apparatus employed for making permanent extension in cases of fractures of the neck of the thigh-bone, or, if possible, to the double inclined plane, which should always be preferred to the one just mentioned, on account of its convenience and its being attended with much less pain to the patient.

Before removing the apparatus, it is of the utmost importance to ascertain that the parts have become perfectly consolidated; and if this is found to be the case, the limb should be carefully enveloped with a bandage drawn moderately tight, in order to prevent the œdematous swelling, which would otherwise be apt to take place. The patient should be requested to keep his bed for about a fortnight longer, and when he is able to walk about he should carefully support himself upon a crutch and afterwards upon a cane.

B.—Fractures of the Condyles of the Os Femoris.

In fractures of the condyles of the os femoris, the limb is to be put in the extended posture, and, after having subdued the swelling and inflammation by means of leeches and evaporating lotions, it will be proper to adopt the advice of Sir Astley Cooper, which is to apply a roller round the knee, and a piece of wet paste-board, about sixteen inches long, and sufficiently wide to extend entirely under the joint, and to pass on each side of it, so as to reach to the margin of the patella. When this becomes dry, it assumes the form of the joint, and is extremely well calculated to keep the bones in contact. Splints of wood or tin may also be used on each side of the joint, in order to consolidate the apparatus.

C.—Fractures of the Neck of the Os Femoris.

In fractures of the neck of the os femoris, the reduction is to

be effected in the same manner as in fractures of the body of the bone, with respect to the extension and counter-extension; but the coaptation must be made in a quite different manner, on account of the thickness of the soft parts which surround the fracture.

The retentive means should always act in such a manner as to counteract the action of the muscles which have a tendency to displace the lower fragment of the bone, and to rotate the foot outwards. For this purpose considerable benefit may be derived from the double inclined plane, to which we have already alluded, and which is almost exclusively employed by some practitioners; but in some cases it is entirely insufficient, and we are therefore obliged to have recourse to an apparatus calculated to keep up permanent extension, which is always more certain to prevent the shortening of the limb and maintain the fragments in apposition. The machine best calculated to fulfil this object, is the one which has been suggested by Professor Boyer. It consists of a mechanical splint, a foot-piece, and a thigh-strap.

“The splint is four feet long, two inches and a half wide, four or five lines thick, and made of strong and inflexible wood. A groove, about half an inch wide, the extremity of which is covered with an iron trimming, runs along this splint for about half its length. This trimming represents three sides of an oblong square, and encloses the sides of the splint, to which it is attached by screws. In the opening of the splint a box is made to slide, by means of a regulating screw, which passes through its centre. The regulating screw extends through the whole length of the opening or cleft in the splint; and one end is made square, so as to be turned by a key; the other end of the regulating screw revolves on an iron plate at the bottom of the cleft. To the sides of the box are attached two square plates of iron, which slide in the sides of the splint. The two plates and the box have an opening perpendicular to that which receives the regulating screw; into this opening is fixed a hexagonal nut, by means of which a piece of iron is fastened to the innermost of the two plates, and is intended to support the foot-piece, when the machine is applied. This piece of iron is formed of two parts united at a right angle, one of which is parallel, the other perpendicular to the side of the splint. One of these parts is square, and has an opening, into which passes the screw that runs across the box, to the inner plate of which it is thus fixed. The second part is about six inches long, and two-thirds of an inch broad, and has an oblong opening to receive a tenon of the foot-piece. Near its end are two tenons and thumb-screws; the former pass through mortices in the legs or supporters, which are secured by the thumb-screws. The legs are six inches long, and curved, their convex surfaces facing each other.

“The upper end of the splint is armed with a piece of iron, on the middle of which is a tenon. Into this is engaged the horizontal part of a crotchet, which is composed of two parts,

united at a right angle. One of these parts is vertical, parallel to the plane of the splint, one inch and a half long, of a semicircular form, and is received into the pocket of the thigh-strap. The other is horizontal, and perpendicular to the plane of the splint: it is three inches long, and has a longitudinal aperture, into which the tenon of the upper end of the splint is received; and the crotchet is retained in its proper place by means of a thumb-screw.

“The foot-piece is of wrought-iron, covered with chamois leather, and furnished with a broad strap of soft skin, split, almost throughout its whole length, into two narrow straps. These pass around the foot and leg, so as to confine the former to the foot-piece. On that side of it which is towards the lower end of the splint, are two tenons, placed in the same vertical line, one of which is engaged in the oblong aperture of the plate of iron which connects the supporters, so that the foot-piece may, by means of a thumb-screw, be retained at a greater or less distance from the splint. The horizontal plate also admits of being inclined in such a way as to rotate the foot-piece inwards or outwards.

“The thigh-strap is formed of two straps of strong leather, united at an acute angle. These are two fingers-breadth wide, covered with sheep's skin, and well stuffed. One is long enough to pass obliquely around the upper part of the thigh, the end is not stuffed, but has small round holes. The other strap is three inches long and has a buckle at its end. On the external side of the thigh, where these two straps unite, is firmly fixed a semicircular piece of thick leather, that forms a pocket opening downwards, and into which is received the vertical portion of the crotchet.

“In applying this machine, we are to place under the limb the piece of linen in which the splints are to be rolled, and five common bands, three under the thigh and two under the leg; a cushion stuffed with cotton, as long as the thigh-strap, and about three inches broad; this must be applied so as to bear exactly upon the ischium, and not upon the internal side of the thigh. Care must be taken to give the thigh-piece, and the cushion placed beneath it, a direction nearly vertical, that they may not become displaced, and press out the internal side of the thigh: when this takes place, the constant pressure will produce ulceration of the integuments, and even of the muscles. In the next place, the sole of the foot and the lower part of the leg are to be adjusted with wads of cotton, and the foot-piece is to be applied, the two straps of which are to be passed obliquely around the leg. These straps not being sufficient to secure the foot-piece, it is further proper to pass a band, about two yards long, around the lower part of the leg, the strap and the foot-piece. The fracture is now to be reduced, according to the principles already laid down. The crotchet of the upper end of the splint being then adjusted in the pocket of the thigh-strap, the regulating screw must be turned to

the left, until the box is raised sufficiently for the foot-piece to be attached to the iron plate which connects the extremities of the supporters. By turning the screw to the right, the box and foot-piece are brought down towards the end of the splint, so as to make extension, while the pressure of the crotchet of the splint upwards, stretches the thigh-strap, fixes the pelvis, and makes the counter-extension. Bags of chaff are then to be placed under the inner and anterior splint, between the machine and the external part of the limb, and between the posterior part of the limb and the splint-bands, and the whole is to be secured by means of ribands or pieces of tape."

Another method of treating fractures of the neck of the os femoris consists in extending the patient's limbs upon a firm mattress, and confining the feet by gaiters or rollers to a foot-board, which is fastened to two splints, five feet and a half in length, half an inch thick, and formed at the upper extremities like the head of a crutch. The lower end of each splint is straight, about an inch and a half or two inches wide, and has six or eight holes, equi-distant from each other, and large enough to admit a stout peg. The foot-board is made of strong wood, one inch thick, twelve inches long, and nine broad. It has eleven perforations, nine of which are intended for the reception of the gaiters, straps or bandages which secure the feet to the board, and the other two for the reception of the lower end of the splints. The gaiters are made of quilted linen or soft leather, and have each four straps, two near the heels, and two near the instep. The remainder of the apparatus consists of three cushions, two of which are long enough to reach from the perineum to the foot, a splint-cloth, similar to that of Desault, and six or eight broad tapes or pieces of roller for the purpose of securing the splints round the limbs, pelvis, and thorax.

The apparatus is now to be arranged upon a firm mattress, as in fractures of the body of the femur, the patient is to be placed upon it, and the ends of the bones are to be carefully adjusted by making extension and counter-extension. The splints, previously covered with their cushions, are next rolled up in the splint-cloth, and brought closely in contact with the body and limbs. The surgeon then fixes the gaiters to the ankles, and secures the feet, placed upon two small cushions, to the foot-board, by passing the straps through the holes, and tying them on the outside. All that now remains to be done, is to interpose the third cushion between the thighs, to tie the tapes, so as to secure the whole apparatus, and to fasten the straps which are attached to the crutch-like extremity of each splint, round the shoulders, in order to prevent the patient from removing his arm-pit.

The above apparatus is the invention of Dr. Gibson, of this city, and is intended as an improvement on that of Hagedorn. It is at present extensively employed in the United States, and is perhaps the best contrivance that has been suggested for fractures of the neck of the os femoris.

The original machine of Hagedorn consists of an excavated splint, between three and four feet long, a foot-board, four or five leather straps, two gaiters and a long pad.

Treatment after the reduction.—After the reduction has been effected, the apparatus should be frequently examined, and the bandages tightened in proportion as they become relaxed. Care should also be taken that the parts suffer no unnecessary compression, or become inflamed or excoriated. When the patient has occasion to relieve his bowels, he should move the fractured limb as little as possible; and with this view we should adopt the method proposed by Professor Richerand, which consists in passing under the pelvis a small

strap or girth, the ends of which are to be tied to a cord which glides in a compound pulley fixed to the top of the bed or the ceiling. Whenever the patient wishes to raise himself he should do it as gently as possible by taking hold of the cord.

The apparatus should be kept on for about two months, but the patient should not be allowed to walk without crutches until ninety days after the occurrence of the accident. If, after the fragments have become perfectly consolidated, the limb should be somewhat shortened, the patient should be requested to wear a shoe with a sole proportioned in thickness to the diminution of the length of the limb.

FRACTURES OF THE PATELLA.

The reduction of a fracture of the patella, whether longitudinal or transverse, may be readily effected by extending the leg strongly upon the thigh, and by bending the thigh upon the pelvis. This position must also be observed in order to effect a consolidation of the ends of the fragments.

The treatment of these fractures, in fact, is extremely simple, and consists in putting the patient in such a posture as will relax the muscles of the leg, and allow the fragments to be brought into contact. For this purpose the leg is to be placed upon an inclined plane formed by pillows in such a manner that its most elevated part shall correspond to the heel, and the most depending part to the buttock. The fragments of the bone are then to be kept in contact by means of a piece of cloth, folded like a cravat, and passed across the lower and anterior part of the thigh, and secured to each side of the bed. This contrivance answers every indication, as has been proved by numerous observations, except in very refractory patients, in whom it will be necessary to use a uniting bandage, or a few strips of adhesive plaster made of Burgundy pitch. When these means, however, fail, it will be advisable to employ the excellent apparatus of Baron Boyer, which consists of a hollow wooden splint, long enough to extend from the middle of the thigh to below the calf, and sufficiently deep to embrace two-thirds of the thickness of the limb. The limb is to be placed in the concavity of the splint, and the fragments of the bone are to be kept in a state of approximation by means of two quilted straps attached to the apparatus.

The apparatus must be kept on for about two months and a half; and when the patient begins to walk, he should always use crutches.

FRACTURES OF THE LEG.

Fractures of both bones.—The reduction of fractures of the leg is always easy, whatever may be their direction. It is accomplished by taking hold of the foot and knee, in order to

make the requisite extension and counter-extension, while the surgeon puts the ends of the fragments in even apposition, by a gentle and graduated pressure round the fracture. When the bone is set, the leg must be confined by three splints, an equal number of soft pads, and an eighteen-tailed bandage. The two side splints should be long enough to extend from above the knee to a certain distance beyond the foot, and the anterior one from the knee to the bend of the ankle. This apparatus, which is to be applied in the same manner as in fractures of the thigh-bone, answers every indication when the bones are broken transversely or in a slightly oblique direction; but when the fracture is very oblique, it is entirely insufficient, and we are therefore generally obliged, in cases of this description, to resort to the apparatus used for making permanent extension. The limb, when confined in the apparatus, should be kept in a semi-flexed position, which is considered by most of the English surgeons as the most advantageous for relaxing the muscles.

The plan of treating fractures of the tibia is precisely similar to the one just recommended; but in fractures of the fibula it is always necessary to make use of a particular apparatus. In reducing the fracture, the foot should be slightly adducted, in order to draw down the lower fragment, and bring it as much inwards as it had been turned outwards by the peronæi muscles. The fragments are to be maintained in contact by means of an apparatus, which keeps the foot turned inwards, and the lower piece of the fibula raised from the tibia, and in the direction of the upper. The most simple and effectual apparatus that can be employed for this purpose, is the one which has been suggested by Professor Dupuytren.

APPARATUS FOR FRACTURES OF THE FIBULA.

This apparatus consists of a cushion, about two feet and a half in length, a strong splint, and two bandages. The cushion, made of linen, and stuffed with hair, is to be doubled in the form of a wedge, and applied on the internal side of the fractured limb, with its base upwards. The splint is then to be placed along the cushion, so as to extend about four inches below the internal margin of the foot. These parts of the apparatus are then to be secured by one of the bandages passed round the limb below the knee. Having done this, the surgeon takes the other bandage, which is to be passed over the instep and heel, so as to embrace alternately the splint and lower part of the leg, in circles forming the figure of 8 with the crossing part on the splint. By this means the foot is drawn inwards towards the splint, and is kept firmly in a state of adduction. When the apparatus is applied, the limb is to be put in a semi-flexed position, and placed upon a few pillows, arranged so as to form an inclined plane.

The apparatus should be taken off in about forty days, and the whole leg covered with a bandage.

FRACTURES OF THE OS CALCIS.

Fractures of the os calcis may be readily reduced by extending the foot and flexing the leg, while the surgeon pushes down the upper fragment. The ends of the fragments are to be kept in apposition by means of a uniting bandage, similar to the one used in transverse wounds, and by a cushioned splint fixed to the anterior part of the leg and foot. The consolidation generally takes place in about forty or fifty days. At the end of the treatment, the patient should commence wearing a shoe with a high heel, the thickness of which is to be gradually diminished until the foot has recovered its former motions.

Dislocations.

I.—TREATMENT OF DISLOCATIONS IN GENERAL.

As the general rules which were laid down in the article on reduction in the preceding part of our work are particularly applicable to dislocations, we shall on the present occasion merely make a few additional observations.

In the reduction of a dislocation, as in that of a fracture, it is necessary, in order to restore the articular surfaces to their natural situation, to employ extension, counter-extension, and coaptation.

The extending force should be applied to the lower part of the dislocated limb, and should be sufficient to dislodge the bone from its unnatural situation, and restore it to its articular cavity. It should be proportioned to the resistance of the muscles, and should be spread over as large a surface as possible. When it is necessary to make very powerful extension, the part of the limb upon which the napkins or sheets are applied, should always be protected by means of a bandage or a small quantity of cotton, so as to prevent the skin from becoming excoriated. The extension is generally made by means of assistants; but in difficult cases Sir Astley Cooper thinks it is always preferable to use pulleys. This gentleman is also of opinion that the extending force should be applied to the extremity of the dislocated bone itself, and not to the lower part of the limb, as is generally done by practitioners, and that it should be continued until the muscles have lost their tendency to resist. The extension should always be first made in the direction in which the dislocated bone is thrown; but in proportion as the muscles yield, the bone is to be gradually brought back to its natural situation. In order that the extension may be rendered more effectual, it is necessary that the

limb should be placed in a semi-flexed position. It sometimes happens that the attempts at reduction fail, owing to the extension not being sufficiently powerful, and the great muscular strength of the patient, which counteracts the efforts to replace the bone. In the latter case, the patient should be freely bled, and placed in a warm bath, so as to produce syncope. The orifice in the vein should always be made large and while the patient is in the erect posture, for reasons which were stated in our account of the treatment of fractures.

In this country, as well as in England, practitioners are often in the habit of giving small doses of tartarized antimony, with a view of producing a temporary relaxation of the muscles; and this remedy appears to be particularly useful in cases in which the surgeon has taken away a large quantity of blood, without being able to induce the slightest degree of faintness. As a general rule, however, we should always give a preference to copious venesection from a large orifice, and while the patient is in the erect posture, taking care that he is well supported by assistants to prevent him from falling.

A temporary faintness may also be induced by administering large doses of gin or brandy, or requesting the patient to smoke a segar, as recommended by Dr. Physick.

Cases in which the reduction should be deferred.—The cases in which the reduction of a dislocated limb should be deferred, are those which are attended with inflammation and swelling of the soft parts which surround the joint, with laceration of the arteries, or hemorrhage, and a complicated or simple fracture, which requires considerable effort to reduce it.—The cases in which no attempt at reduction should be made at all, are those which are accompanied with severe injury of the tendons, muscles, ligaments and articular surfaces; for, under these circumstances, it will be necessary immediately to have recourse to amputation.

Treatment after the reduction.—After the fracture has been reduced, the limb should be kept perfectly at rest, and in such a position that the muscles which surround the joint, shall not be able to produce another displacement. The inflammation and other unpleasant symptoms which usually accompany this accident, should be subdued by the ordinary antiphlogistic means, and as to the swelling and difficulty of motion, which sometimes remain a considerable time after the reduction of dislocations of the ginglymoïd joints, it is necessary to make frequent, gentle, and graduated motion, and to employ oleaginous embrocations, the warm or cold bath, and apply a flannel roller round the limb.

II.—TREATMENT OF PARTICULAR DISLOCATIONS.

Dislocation of the Clavicle.

Reduction.—*Dislocation of the sternal extremity.*—If the dislocation be forwards, the patient is to be seated upon a low stool, and his body is to be steadied by an assistant. The bone is reduced by putting a thick wedge-like pad under the axilla, and by carrying the arm a little upwards and forwards. By this manœuvre the upper extremity of the humerus will be carried outwards, and the luxated bone will resume its situation. After having ascertained that the reduction is effected, the elbow is to be carried backwards, so as to push the scapula forwards, and thereby prevent a return of the displacement. When the dislocation is backwards or upwards, it is necessary, after having reduced the bone, in the manner just specified, to push the scapula backwards, in the first case, and upwards in the second.

Dislocation of the humeral extremity.—In cases of dislocations of the humeral extremity of the clavicle, it will be sufficient to carry the shoulder upwards and outwards, and to make gentle and graduated pressure upon the luxated extremity, until the bone has slipped in its place.

Retentive means.—These means are the same as in fractures of the clavicle, except that the graduated compresses, which are applied to the luxated extremity of the bone, are to be fixed by a few turns of the bandage. The exact maintenance of the reduction, however, by any apparatus whatever, is always a matter of the greatest difficulty; but, notwithstanding this disadvantage, the patient generally recovers the use of his limb.

DISLOCATION OF THE HEAD OF THE HUMERUS.

Reduction.—The patient being seated upon a chair of moderate height, a thick linen compress is to be applied to the axilla, on the side affected, and upon this compress is to be placed the middle of the first extending bandage, the two ends of which ascend obliquely before and behind the thorax, and meet each other at the top of the sound shoulder, where they are twisted and secured to a hook fixed in the wall. Having done this, a towel, doubled several times, is to be applied to the fore-arm, above the wrist. The two ends are to be twisted together, and are held by a sufficient number of assistants. A

third bandage, or towel, is then to be applied to the prominent margin of the acromion process, and after its two ends have been carried obliquely before and behind the chest, until they meet on the sound side, they are to be held by an assistant, who is to pull them downwards, so as to prevent the scapula from obeying the extending efforts. This bandage is to be prevented from slipping upwards, by means of an assistant.

After having observed these precautions, the surgeon, standing on the outside of the limb, requests the assistant to make extension, by pulling gently and steadily in the same direction in which the bone has been displaced. As soon as the head has been disengaged, the assistants are to bring the humerus to its natural situation, while the surgeon pushes the head of the bone towards the glenoid cavity, in a direction oppositely to that in which it had been displaced. The extension should be discontinued as soon as the reduction has been accomplished.

When there is a consecutive dislocation into the sub-scapular fossa, the head of the humerus should first be brought below the glenoid cavity, after which the case is to be managed just as if it were a primitive dislocation into the hollow of the axilla.

After the dislocation has been reduced, the head of the bone should be prevented from slipping out of its place again, by confining the arm close to the side for some days, and supporting it in a sling.

DISLOCATION OF THE HUMERO-ULNAR ARTICULATION.

Reduction.—In a luxation backwards, the reduction may sometimes be effected by pulling slightly at the wrist, at the same time that the olecranon is pushed downwards and forwards; but if this attempt should fail, the patient is to be seated upon a stool, the limb is to be slightly separated from the trunk and directed obliquely forwards, while an assistant lays hold of the arm near the axilla, and another of the wrist, in order to make the necessary extension and counter-extension. The surgeon, standing on the outside of the limb, takes hold of the elbow with both hands, by applying the fore-fingers of each to the anterior part of the humerus, and the thumbs to the posterior with which he pushes on the olecranon in a direction downwards and forwards, taking care not to forget to flex the fore-arm. This method is generally attended with perfect success.

When the reduction has been accomplished, the joint is to be covered with wet compresses, supported by a bandage, carried round the elbow in the form of a figure-of-eight, and the arm is to be kept in a sling. In about seven or eight days, when the swelling and inflammation have subsided, the joint is to be

gently moved, and the motion is to be daily increased, in order to prevent ankylosis.

The dislocation of the ulna, which necessarily accompanies the fracture of the olecranon, requires the same treatment, after being reduced, as that fracture.

With respect to the lateral luxations of the bones of the fore-arm, the reduction may be performed by flexing the elbow and making the extension and counter-extension in the manner just mentioned, while the surgeon gently pushes the humerus and the bones of the fore-arm in opposite directions.

When the upper end of the radius is dislocated backwards, the reduction may be effected by making extension and counter-extension at the wrist and arm, while the surgeon pushes the displaced bone from behind forwards, taking care that the assistant who makes the extension, brings the hand gradually in a state of supination. After the reduction has been accomplished, the limb should be kept in this position by means of a roller, wet compresses, and a splint, extending from the palm of the hand to the inferior third of the arm.

In the dislocation of the head of the radius forwards, the reduction is to be accomplished by extending the fore-arm, at the same time that the surgeon tries to push the displaced bone from before backwards in its natural situation. When this has been done, the arm should be kept flexed and in a middle state between pronation and supination, by means of a splint, a few compresses, and a bandage, until the lacerated parts are healed.

In the luxations of the lower end of the ulna backwards, an assistant is to take hold of the hand, and make extension, while another assistant makes counter-extension at the inferior part of the arm. The surgeon then brings the lower end of the ulna to a level with the internal part of the radius, and presses it gently from behind forwards; at the same time that the assistant who holds the hand brings it slowly in the supine posture, and inclines its ulnar edge towards the inner side of the fore-arm.

When the lower end of the ulna is dislocated forwards, the hand should be slightly flexed by the assistant who makes the extension, while the surgeon pushes the ulna inwards with both his hands; one applied to the inside, the other to the outside of the fore-arm, in such a manner that the two thumbs shall meet each other in front of the limb, while the fingers are applied to the back of the wrist. While the surgeon endeavours to direct the bone to its natural situation, the assistant holding the hand, should try to bring it into a state of supination.

Retentive means.—In both the preceding cases, it will be necessary, after having effected the reduction, to apply a roller round the hand, and four compresses, dipped in some evaporating lotion, along the fore-arm. Over these compresses are to be placed an equal number of splints, which are to be

fixed by means of a bandage. The hand should be kept in a position between pronation and supination, and the fore-arm is to be semi-flexed and supported in a sling.

DISLOCATION OF THE CARPUS.

Reduction.—The reduction of the dislocated bones may be accomplished by putting the limb in a semi-flexed posture, and making counter-extension at the upper part of the fore-arm, and extension upon the metacarpus, while the two surfaces of the joint are made to slide upon each other in a direction contrary to that in which the displacement occurred, taking care that the assistant who makes the extension, brings the hand in its natural direction.

Retentive means.—The retentive means are the same as those which we had occasion to point out in speaking of luxations of the inferior extremity of the ulna.

DISLOCATION OF THE OS MAGNUM.

The reduction may be readily accomplished by extending the wrist, and making pressure upon the head of the os magnum, on the back of the carpus. A renewal of the displacement should be prevented by means of two splints, applied to the anterior and back part of the hand, and by proper compresses, and a roller.

DISLOCATION OF THE METACARPUS.

The reduction of a dislocation of the metacarpal bones, is accomplished by making extension upon the phalanges of the corresponding finger, and counter-extension upon the fore-arm, at the same time that the surgeon pushes the extremity of the luxated bone into its natural situation. The reduction is maintained by means of long, thick and narrow compresses, applied along the anterior and back part of the hand, and by two long splints, placed over these compresses and fastened with a narrow roller.

DISLOCATION OF THE PHALANGES OF THE FINGERS.

In order to reduce these dislocations, the fore-arm should be held in a semi-flexed posture, and the phalanx should be extended either with the hand, or a noose, while the surgeon presses upon the displaced extremity of the bone, in such a manner as to push it below the articular surface.

The reduction of these luxations is sometimes attended with considerable difficulty, especially when the subject is very strong and muscular. It should always, however, be

speedily accomplished; for after eight or ten days, it becomes perfectly impracticable; but the attempts should never be so long continued as to produce severe pain and swelling: it will be better, in fact, to wait until these symptoms have subsided, or to leave the bone in a state of displacement, than to cut down upon the dislocation, as was recommended by Desault, and push the head of the bone into its place by means of a spatula.

After the reduction, the finger should be rolled with tape, and supported with paste-board splints; care being taken to carry the hand and fore-arm in a sling, until the parts have become united.

DISLOCATION OF THE HEAD OF THE OS FEMORIS.

Reduction.—Before making any attempts at reduction, it is proper, if the subject be robust, to make use of the debilitating means to which we have alluded in speaking of the general treatment of dislocations. These precautions, however, may sometimes be dispensed with; for there are cases where two assistants are quite sufficient to make the necessary extension and counter-extension.

After having ascertained the species of dislocation, and taken the precautions just mentioned, the patient should be placed upon a bed or firm table, covered with a mattress. A sheet, folded longitudinally, is first to be placed in the bend of the sound thigh, and one end being carried before the patient, and the other behind him, they are to be fastened to a hook in the wall, or to one of the posts of the bed. Another extending bandage, or a folded towel, is then to be applied below the crista of the os ilium of the affected side, and its two ends, which meet each other at the top of the pelvis of the opposite side, are to be held there by an assistant, so as to fix the trunk. In order to make the necessary extension, another towel, doubled several times, is to be applied above the ankle, or, as has been advised by Sir Astley Cooper, above the condyles of the os femoris. The two ends are to be twisted together, and committed to the care of an assistant. The extending bandages are to be prevented from injuring the skin, by means of compresses, or a proper quantity of cotton, applied previously to making the extension and counter-extension.

After having taken these precautions, and placed the patient on his sound side, the surgeon is to request the assistants to make the requisite extension and counter-extension, in a gradual and unremitting manner; and as soon as there is reason to conclude that the bone has been disengaged from the place in which it had been thrown, he is to endeavour to put it in its natural situation. The counter-extension, it must be remembered, is always to be made in the direction indicated by the counter-extending bandage, but the direction in which the

extension is to be made, differs according to the circumstances of the case.

In the dislocation of the thigh-bone on the dorsum of the ilium, the reduction is to be accomplished by making the extension and counter-extension in such a manner as to bring the thigh forwards and inwards, while the surgeon tries to press the great trochanter from above downwards.

When the thigh-bone is dislocated backwards and outwards, or in the ischiatic notch, the extension is to be made precisely in the same manner as in the preceding case; but the surgeon, in order to make the coaptation, is to apply his hands to the upper part of the thigh, and raise it in such a manner as to bring the head of the bone in front of the posterior margin of the acetabulum, behind which it had been thrown.

In the luxation of the os femoris upon the obturator foramen, the extension is at first to be made downwards and outwards, so as to dislodge the head of the bone, and, while the surgeon raises the upper part of the thigh in the manner just specified, the assistants are to bring the limb slowly from without inwards. The rest of the operation is to be finished as in cases in which the bone is luxated directly downwards.

When the os femoris is dislocated on the pubes, the patient is to be placed upon his back, the surgeon is to elevate the upper extremity of the thigh, and, while the assistants make the extension parallel with the axis of the body, he pushes the head of the bone from above downwards.

After the reduction has been accomplished, the bone is to be kept from slipping out again, by confining the patient in his bed, and tying his thighs together, and keeping them in a semi-flexed posture by means of pillows placed under the hams.

DISLOCATION OF THE PATELLA.

Reduction.—In cases of incomplete luxations of the patella, the reduction may be effected by bending the thigh upon the pelvis, and extending the leg as much as possible upon the thigh, while the patella is pushed in a direction contrary to that in which the displacement occurred. When the luxation, however, is complete, it is always necessary to begin with bringing the bone on a level with the anterior part of the condyles.

When the bone has been restored to its natural situation, and there is such a relaxation of the ligaments, as to be likely to produce a recurrence of the accident, the patient should be requested to wear a laced knee-cap, with a strap and buckle above and below the patella, as advised by Sir Astley Cooper.

When the bone is dislocated upwards, in consequence of a rupture of the ligament of the patella, recourse should be had to early depletion, to the use of evaporating lotions for five or six days, and then to the application of a bandage round the foot and leg, to prevent its swelling. The leg is to be

kept in an extended posture, by means of a splint behind the knee; a leather strap is to be buckled round the lower part of the thigh, and to this on each side is to be attached another, which extends from the sole of the foot, and is carried up on each side of the leg. By this means the patella is kept in its proper place, and the ligament is enabled to unite.—*Sir A. Cooper on Dislocations*, p. 146.

DISLOCATION OF THE KNEE.

In cases of lateral, recent, and incomplete dislocations of the tibia, the reduction may be easily accomplished by making gentle extension, while the leg is held in a semi-flexed posture, and pushing the femur and head of the tibia in opposite directions.

In an incomplete luxation of the tibia backwards, provided it is not of very long standing, and unaccompanied by pain, recourse should be had to some mechanical apparatus, which will have a tendency to restore the bone to its natural situation.

PARTIAL DISLOCATION OF THE THIGH-BONE FROM THE SEMI-LUNAR CARTILAGES.*

This complaint, which was first described by the late Mr. Hey of Leeds, and since by Sir Astley Cooper, is said to be owing to a relaxed state of the ligaments of the knee-joint, which allow the semi-lunar cartilages "to be easily pushed from their natural situation by the condyles of the os femoris, which then come in contact with the head of the tibia."

This accident may generally be remedied by bending the leg as far back as possible, so as to enable the cartilage to glide into its natural situation; but if this attempt should fail, the reduction may sometimes be accomplished by seating the patient upon the floor, and then bending the thigh inwards and pulling the foot outwards, as in the case related by Sir Astley Cooper.

DISLOCATION OF THE ANKLE-JOINT.

Whatever may be the direction of these dislocations, the patient should always be placed in a recumbent posture, the muscles of the leg should be relaxed by bending the limb, and the requisite extension and counter-extension are to be made by means of two assistants, one of whom is to lay hold of the foot, and the other of the lower part of the thigh. The surgeon then takes hold of the lower part of the leg, near the malleoli, with both his hands, and presses upon the astragalus in such a manner as to return it into its cavity, while the assistant holding the foot, facilitates the reduction, by bringing it in its natural position.

* By the translator.

When the operation is completed, the bones should be kept in their proper situation by means of the apparatus which is employed in cases of fractures of the lower part of the leg, and by supporting the limb in a semi-flexed posture upon a pillow. The patient should keep his foot at rest for about six weeks, care being taken to move the joint every day to prevent anchylosis.

EXTERNAL ANEURISMS.

General Treatment of Aneurisms of the Extremities.

Of all the various methods that have been recommended at different times for the cure of external aneurisms, there is only one which may be said to be worthy of our approbation: this consists either in tying the artery above the tumour, with a view of intercepting the passage of the blood, and producing an obliteration of the cavity of the sac, or in tying the vessel both above and below the tumour, near the origin of the nearest collateral branches. Notwithstanding this, however, there may be cases in which it may be proper to employ a kind of mixed treatment, consisting of the simultaneous employment of internal debilitants, of cold applications to the tumour, and moderate but unremitting pressure. The debilitating means, which constitute Valsalva's treatment, consist of repeated bleedings, perfect quietude, spare diet, the moderate use of water or cooling drinks, and the administration of digitalis, with a view of lessening the impetus of the circulation. The cold applications which are most commonly used, are powdered ice, and thick compresses, dipped in oxycrate, a solution of lead water, or some astringent decoction. These different remedies, however, should always be discontinued, if, notwithstanding their steady and methodical employment, the tumour gradually augments in size; for, under these circumstances, they will only produce unnecessary debility, pain, and cough, and, sometimes, even mortification of the skin.

With respect to systematic compression, it may be made in different ways. According to the simple method of Guattani, it is made by covering the tumour with scraped lint, and a few compresses, and by placing a long compress over the course of the artery, above the tumour, and then applying a bandage moderately tight, from the lower to the upper part of the limb. This apparatus is to be frequently wetted with cold lotions, and is to be renewed once about every fifteen days. When the aneurismal tumour is painful, and the integuments covering it attenuated and inflamed, the compression should always be made above the tumour, that is, between it and the heart, over the course of the artery, provided the vessel be superficial and admits of being compressed. The pressure

should always be made gradually, and in such a manner, that the compress shall act evenly upon the artery, and not obstruct the circulation in the other parts of the limb. This indication is admirably fulfilled by the compressor invented by Professor Dupuytren, but like most other contrivances of the kind, it sometimes creates severe pain, numbness of the limb and excoriation of the skin, and can not always be properly fixed.

Although these different means have sometimes effected a cure in cases of large aneurismal tumours, either separately or conjointly, yet most surgeons prefer the ligature, which is justly regarded as the grand means, most to be depended upon, for curing aneurisms of the extremities. The method which is most generally adopted by practitioners of the present day, is that which is known under the name of Anel's method, and which consists in tying the artery above the aneurismal tumour, without opening its sac.

OPERATION FOR ANEURISM.

The operation for aneurism, in whatever part of the body it may be performed, is subject to general rules, the most important of which we shall now proceed to notice.

Apparatus.—The apparatus which is required for performing this operation, consists of two bistouries, one convex, the other straight and probe-pointed; a pair of forceps, and scissors; very flexible silver stylets and needles; a grooved director; Desault's aneurism-needle; ligatures; soft sponges; cold water; and the materials necessary for dressing the wound.

Operation.—The patient being placed in a recumbent posture, is to be held by proper assistants, and his limb is to be put in a semi-flexed position. Another assistant should be ready to compress the artery near its trunk, either with his fingers, or by means of a compress or tourniquet, in order to avoid hemorrhage during the operation. The incision should be made at some distance from the tumour, over the most superficial part of the artery, and in such a manner that the ligature may be placed between the aneurismal bag and the nearest collateral branches, at a proper distance from both. It should vary in extent according to the depth of the artery, and should be made with a convex bistoury, in the direction of the vessel; which is afterwards to be carefully separated, to the requisite extent, from the adjacent veins and nerves. As soon as the cellular sheath which surrounds the vessel, is fairly brought into view, it should be pinched up with a pair of forceps, and opened with a convex bistoury carried from within outwards, as practised by Professor Dupuytren, or by tearing it with the grooved director or finger.—When the artery has been laid bare to the extent of about two or three lines, the end of the director is to be glided under it,

and upon this is to be carried a curved needle, armed with a ligature. If the artery be healthy and of moderate size, the ligature should be quite small, and made of dentist's silk, and should be tied with sufficient firmness to divide the internal and middle coats of the vessel. This condition is absolutely necessary for the prompt agglutination of the parietes of the artery, and we should therefore always endeavour to obtain it by the employment of a small ligature; since, as is asserted by Hodgson, the successful practice of the English surgeons has demonstrated the fact, that there is seldom, if ever, any danger of producing a complete division of the coats of a healthy artery, even with the most delicate ligature. In tying a large artery, however, which can be easily isolated, and in which there is reason to expect to meet with an alteration of structure, it will be proper to follow the advice of Scarpa, which consists in using a flat ligature, composed of from four to six threads, and in interposing between the knot and the artery a small cylinder, made of cloth or adhesive plaster, one line wide, and just long enough to extend about a line above and below the ligature. The ligature is then to be loosely tied over this cylinder, with a view of flattening the artery, without dividing its coats. In all cases, the ligature should be applied transversely to the axis of the vessel, and be tied into two simple knots.

Treatment after the operation.—When the operation is finished, the wound is to be carefully cleaned, and its edges are to be brought into contact; care being taken that the ligature shall have been cut off close to the knot, as recommended by Mr. Lawrence. If, on the contrary, the operation have been performed according to Professor Scarpa's method, the end of the ligature is to be placed in one of the angles of the incision, which is to be dressed like a common suppurating wound, and the surgeon is to wait for the separation of the ligature and cylinder, which seldom happens before the eighteenth day.—When the parts have been dressed, the limb is to be placed in the most favourable position for relaxing the wounded artery, and is to be surrounded with small bags of warm sand or bladders filled with some warm aromatic infusion. The inflammatory, spasmodic, or other unpleasant symptoms which frequently follow this operation, are to be prevented or subdued by the ordinary means.

Accidents.—The most common accident that happens after the operation of tying an artery is hemorrhage. When this occurs, the dressings should be immediately removed, and, after having ascertained the place from which the blood escapes, a new ligature is to be applied above the chink or crevice of the vessel. If the wound be inflamed, and there is reason to conclude that the artery participates in the inflammation, great care should be taken to apply the ligature much higher up, round a healthy part of the vessel; but if this be impracticable, either because the ligature must be carried too near the

origin of a large collateral branch, or the tumour itself, or because the alteration of the artery is very extensive, and the new ligature has been already spontaneously detached, the wound should either be plugged, or, what is still better, the artery should be compressed between two small wooden spatulæ, as has been successfully practised by Desault and Dupuytren.

If, instead of gradually diminishing, the tumour augments in size, or breaks, no time should be lost to ascertain the cause of the accident by compressing the artery above the ligature, or between the ligature and the aneurism, immediately above the tumour. If it be found that the ligature does not intercept the course of the blood in the portion of the vessel which it embraces, it should be placed farther up.—“If, in a case of secondary aneurism, the pulsation ceases by compressing the artery a little above the tumour, the surgeon is justified in tying the vessel as near as possible to the sac. The same observation holds good in tying the vessel below the tumour, when the ingress of the blood is arrested by compressing the lower part of the artery.”*

When there is much difficulty in ascertaining the exact passage through which the blood regurgitates, or flows back into the tumour, and no benefit has been derived from compression, a spare diet and cold applications, it will be necessary either to open the aneurismal sac, or to amputate the limb. A rupture of the sac also requires one or other of these operations; and the same observation obtains in cases of gangrene, unless it is very trifling, or has supervened a long time after the separation of the ligatures, and is unaccompanied by hemorrhage; in which circumstance, the ordinary treatment that is employed in this affection will be quite sufficient.

TREATMENT OF PARTICULAR ANEURISMS OF THE EXTREMITIES.

Ligature of the Subclavian Artery below the Clavicle.

The operation of tying the subclavian artery is indicated in cases of axillary aneurisms, or in hemorrhage from wounds of the hollow of the axilla, and is performed in the following manner. The patient being placed upon a bed with his head somewhat higher than the rest of the body, an assistant is to compress the artery in order to avoid hemorrhage, and after having separated the arm from the trunk as far as is necessary, the surgeon makes an incision, four inches long, through the skin and pectoralis major, commencing below the clavicle, directly opposite to the outer edge of the sterno-cleido-mastoideus, and terminating towards the axilla, parallel with the fibres of the great pectoral muscle. Having done this, and secured the

* Hodgson on the Diseases of the Arteries, &c.

small arteries that may have been divided, the arm is to be brought a little towards the trunk, and the edges of the wound are to be separated by means of a blunt hook held by an assistant, while the surgeon feels for the artery between the clavicle and upper end of the pectoralis minor. In this place, the vessel is in relation, in front and below, with the axillary vein, above and behind with the brachial plexus, and not unfrequently in front with a cord of the same plexus. After the artery has been fairly brought into view, it is to be separated from the vein and nerves by means of the extremity of a grooved director; after which the ligature is to be passed round it, care being taken not to include the nervous cord which passes in front of the artery. When the ligature has been properly placed, which may generally be known by pulling gently at its loop, it is to be tied into a double knot. After the operation is finished, the arm is to be brought near the trunk, and placed upon a pillow.

LIGATURE OF THE BRACHIAL ARTERY.

When the aneurism of the arm is seated very high up, and extends under the axilla, the ligature should be applied in the same manner as in the preceding case; when, however, it occupies the lower part of the arm, it becomes necessary to tie the brachial artery near the middle of the limb, in the manner we shall presently point out. The same operation is also indicated in cases of aneurisms of the upper part of the radial or ulnar artery, excepting that it must be performed near the elbow-joint.

Having placed the arm upon a pillow and separated it from the trunk, and put the fore-arm in a semi-flexed position, the operator searches with the point of the index finger for the median nerve along the inner edge of the biceps muscle, in order to ascertain the precise direction of the artery, which follows that of the nerve. The integuments are then to be divided along the inner margin of the muscle by an incision from two to three inches in length. The thin fascia which covers the artery will thus be exposed, and must be carefully divided in the direction of the external incision. The median nerve, which lies on the ulnar side of the artery, is next to be separated, and the ligature passed from within outwards with the precaution to which we have already alluded.

It sometimes happens that the brachial artery divides near the axilla into two branches, which descend parallel on each side of the biceps; when this is found to be the case, it is of course, only necessary to tie the diseased branch. Before the operation is commenced, therefore, it is always proper to ascertain that no such anomaly exists.

LIGATURE OF THE RADIAL ARTERY.

The operation of tying the radial artery is to be performed immediately above the tumour when the aneurism is situated below the upper third of the fore-arm. In this case, in fact, it may even be advisable to apply two ligatures, one above and the other below the sac.

In performing this operation at the middle of the fore-arm, and especially near the wrist, an incision, about two inches in length, is to be made between the edges of the supinator radii longus and radialis internus, and, after having separated the artery from the branch of the radial nerve which is situated on its outer side, the point of an aneurism-needle is to be introduced close to the radial, and brought out on the ulnar side of the vessel, so as to avoid including the nerve or veins which accompany the artery.

LIGATURE OF THE ULNAR ARTERY.

In tying the ulnar artery at the upper part of the fore-arm, an incision, three or four inches in length, is to be made upon the course of the upper part of a line, drawn from the internal tuberosity of the humerus to the ulnar side of the os pisiformis. When the integuments have been divided, the junction of the ulnaris internus and flexor superficialis muscles will thus be exposed, and must be cautiously divided in the direction of the external wound. The edge of the flexor superficialis is then to be reflected, and the ligature is to be passed round the artery by means of a curved, probe-pointed needle, care being taken not to include the nerve which lies on its inner side.

In taking up the ulnar artery below the middle of the fore-arm, between the tendons of the ulnaris internus and flexor superficialis muscles, it is necessary to make an incision, about two inches long, beginning six lines above the os pisiformis, and extending parallel with the artery. After having divided the fascia, an assistant is to draw the inner edge of the wound towards the ulna, and, as soon as the artery, which is situated on the outside of the ulnar nerve, is fairly brought into view, it is to be raised and tied.

LIGATURE OF THE EXTERNAL ILIAC ARTERY.

The operation of tying the external iliac artery is indicated in cases of inguinal aneurism or hemorrhage in consequence of wounds of the upper part of the femoral artery, and even in cases of femoral aneurisms, near the origin of the arteria profunda. The operation was first performed in 1796, by Mr. Abernethy, whose method, which will presently be described, has been adopted by most of the French surgeons.

a.—Abbernethy's Method.

The patient being placed upon a horizontal table, well covered, an incision, four inches in length, is to be made through the integuments of the abdomen, commencing about one inch and a half in front of the anterior superior spine of the os ilium, and terminating about half an inch from Poupart's ligament. An assistant then bends the thigh, while another separates the edges of the wound. The aponeurosis of the external oblique muscle, having been previously exposed, is next to be divided in the direction of the external wound. The inferior margins of the internal oblique and transversalis muscles being thus brought into view, the surgeon introduces his finger beneath them to protect the peritoneum, and then divides them with a probe-pointed bistoury. The fore-finger is now to be passed behind the peritoneum, until it comes into contact with the inner edge of the psoas muscle, where it will distinctly feel the pulsations of the artery. The vein corresponds to the internal side of the artery, and is connected to it by means of dense cellular tissue, which is to be divided with the nail or bistoury in such a manner as to enable the surgeon to pass a curved blunt needle between the two vessels and make the instrument come out on the external side of the artery. The crural nerves, which are situated much farther on the outside than the nervous filament which passes upon the artery, and accompanies it as far as its exit through the pelvis, may generally be easily avoided. But if, notwithstanding every possible precaution, the nervous filament happens to be included in the ligature, it should by all means be cut across before the vessel is tied. The ligature should be applied more or less remote from the tumour, according to its size, and the direction of the vessel. As a general rule it should never be passed too near the origin of the internal iliac artery, or to that of the circumflex iliac or epigastric.

In making the incision through the muscles, or in searching for the artery, it not unfrequently happens that the peritoneum protrudes between the edges of the wound: to prevent it from being injured it is necessary that an assistant should push it back towards the mesian line, and that the patient should keep himself perfectly quiet. When there is considerable difficulty in tearing the thin aponeurotic membrane which sometimes covers the artery, it should be cautiously divided with the knife.

When the operation is finished, the edges of the wound are to be brought into contact, and the patient is to be placed in such a position, that the trunk shall be slightly elevated towards the shoulders, and the thigh gently flexed upon the pelvis.

*b.—Sir Astley Cooper's Method.**

The operation consists in making a semi-lunar incision through the integuments, extending from a little above the inner margin of the abdominal ring to near the spine of the ilium. The aponeurosis of the external oblique muscle which is thus exposed is to be divided throughout the extent and in the direction of the external wound. The flap is then to be reflected, when the spermatic cord will be seen passing under the margin of the internal oblique and transverse muscles. The opening in the fascia which lines the transversalis, through which the spermatic cord passes, is situated midway between the antero-superior spinous process of the ilium, and the symphysis pubis. The epigastric artery runs precisely along the inner margin of this opening, beneath which the external iliac artery is situated. If the finger therefore be passed under the spermatic cord through this opening in the fascia which lines the transverse muscle, it will come into immediate contact with the artery, which lies on the outside of the external iliac vein. The artery and vein are connected together by dense cellular tissue, which must be separated to enable the operator to pass a ligature, by means of an aneurism-needle, round the former.—*See Hodgson on the Arteries and Veins*, p. 421.

LIGATURE OF THE INTERNAL ILIAC ARTERY.*

This operation was first performed by Mr. Stevens, an eminent surgeon in Santa Cruz, on the 27th of December, 1812, for the relief of an aneurism of the gluteal artery. It has since been performed by Mr. Atkinson of York, and by an army-surgeon in Russia, upon whom the Emperor Alexander settled a pension, as a reward for the skill displayed in treating the case.

Method of Mr. Stevens.

Having placed the patient upon his back, the surgeon is to make an incision, about five inches in length, through the inferior and lateral part of the parietes of the abdomen, parallel with the course of the epigastric artery, and about half an inch on the external side of that vessel. After having successively divided the integuments, the superficial fascia, and the three muscular layers of the abdomen, the peritoneum is to be cautiously separated from its connexions with the iliacus internus and psoas magnus, and turned inwards from the antero-superior spinous process of the os ilium to the division of the common iliac artery. The surgeon now introduces the finger into the

* By the translator.

wound, as far as the vessel, and with a common blunt-pointed aneurism-needle passes the ligature underneath it.

When the operation is finished, the lips of the wound are to be brought into contact, and kept in this position by a few sutures, strips of adhesive plaster, and light dressings.—See *Medico-Chirurg. Trans.* vol. v. p. 422.

LIGATURE OF THE FEMORAL ARTERY.

When this operation becomes necessary in consequence of a popliteal aneurism or a wound of the femoral artery, below its middle, it is to be performed according to the method of Scarpa, in the union of the upper third of the thigh.

“The patient being placed upon the edge of the bed, with his head and shoulders a little higher than the nates, his leg and thigh are to be put in a semi-flexed posture, and are to be supported upon a pillow. An assistant is then to stand on the outside of the limb, in order to compress, if necessary, the femoral artery as it passes over the brim of the pelvis. The surgeon now explores with his fore-finger the course of the artery from the crural arch downwards, and when he comes to the place where the pulsation of this vessel begins to be less distinctly felt, this point is to be fixed upon for the lower angle of the external incision. This angle of the wound will fall nearly on the inner edge of the sartorius, precisely at the place where this muscle crosses the track of the superficial femoral artery, and at the apex of the triangular space formed by the convergence of the second head of the triceps and vastus internus. A little more than three inches above this place, the surgeon is to begin, with a convex-edged bistoury, the incision through the integuments and cellular tissue, and carry the wound down the thigh, in a slightly oblique line, from without inwards, so as to make it follow the course of the artery, as far as the apex of the above-mentioned triangular space.* Having thus exposed the aponeurotic expansion of the fascia lata, which covers the course of the artery, it is next to be divided, with every possible precaution, in the direction of the external wound.”—Scarpa on Aneurism, translated into French by M. Delpech.

This operation is not only recommended in case of popliteal aneurism, but also when this disease is situated at the upper part of the leg. When the aneurismal tumour, however, or a wound of the anterior or posterior tibial artery, is situated towards the lower part of the leg, one of the following operations is preferable.

* It is generally preferable to commence and terminate this incision about an inch lower down, so as to be farther from the profunda, and be enabled, if necessary, to tie the femoral artery a second time. It is requisite, therefore, in order to expose the lower part of the vessel, to reflect the inner edge of the sartorius.

LIGATURE OF THE POPLITEAL ARTERY.

Having placed the patient upon his abdomen, the surgeon makes an incision, several inches in length, beginning at the inner edge of the base of the triangle which forms the popliteal space, and terminating at the apex of the space just mentioned. An assistant then bends the limb slightly, so as to tighten the parts, while the surgeon divides the cellular tissue and crural aponeurosis, in the direction of the external wound. Having thus exposed the popliteal artery and vein, they are to be carefully separated with the finger or the handle of the scalpel, and the former secured with the ligature. This operation is particularly indicated in cases of wounds of the upper part of the tibial arteries; but in the aneurismal tumours which occur in this place, the preceding is preferable.

LIGATURE OF THE ANTERIOR TIBIAL ARTERY, NEAR THE MIDDLE OF THE LEG.

Lisfranc's Method.

Extending the leg, and resting it on its posterior surface, the surgeon makes an incision on the outside of the spine of the tibia, in a direction obliquely from within outwards, in such a manner that its upper part shall be an inch or an inch and a half from the spine of the bone, according to the size of the limb. The integuments, cellular tissue and aponeurosis of the leg being thus successively divided, the surgeon separates the tibialis anticus and extensor communis digitorum pedis, between which he will find the artery resting upon the interosseous ligament, having its accompanying vein on its inside, and the anterior tibial branch of the sciatic nerve on its outside.

In tying this artery at the lower part of the leg, it may be easily brought into view by making an incision through the integuments and aponeurosis between the tendons of the extensor communis digitorum pedis and the extensor proprius pollicis, beneath which it may be seen passing in an oblique direction.

LIGATURE OF THE POSTERIOR TIBIAL ARTERY.*

At the middle of the leg.—The posterior tibial artery may be secured in this situation, by making an incision, three or four inches in length, through the integuments along the inner side of the spine of the tibia. The origin of the soleus muscle is then to be detached from the tibia in the direction of the external wound, and reflected. After having divided the fascia which separates the muscles of the calf of the leg into superfi-

* By the translator.

cial and deep-seated, the artery may be seen lying upon the tibialis posticus and flexor digitorum pedis muscles. It is situated between the two venæ comites, and has the tibial nerve on its fibular side.

Behind the malleolus internus.—In this situation the posterior tibial artery is quite superficial, and may be easily brought into view by making an incision, about two inches in length, between the inner malleolus and the tendo-Achillis, down to the posterior surface of the tuberosity of the tibia. At this depth it lies nearer to the os calcis than the tendons of the tibialis posticus and the flexor digitorum pedis. "It retains the same relative situation with regard to its veins and the tibial nerve as in the middle of the leg."

LIGATURE OF THE ARTERIA DORSALIS PEDIS.*

Having flexed the leg on the thigh, and placed the sole of the foot upon a solid plane, the surgeon makes an incision, about two inches in length, through the integuments and dorsal aponeurosis of the instep of the foot in the direction of the second toe. The edges of this incision are then to be separated, so as to bring into view the tendon of the extensor longus pollicis, situated on the inside of the foot, and the first tendon of the extensor digitorum pedis. Having thus exposed the artery, it is to be secured by means of a common aneurism-needle, and the wound is to be closed with a few strips of adhesive plaster.

CHRONIC ULCERS OF THE LEGS.

By this vague expression surgeons understand those ulcerations which are of such frequent occurrence in old people, and which appear to be uniformly owing to such a degree of local debility as to impede the process of cicatrization, notwithstanding protracted quietude, the best directed internal treatment, and the most methodical dressings. These ulcers, although extremely obstinate, are, nevertheless, sometimes susceptible of healing, and that in a very short time, under the influence of proper compression, especially when applied according to the method which was first proposed and practised by Mr. Baynton.

COMPRESSION OF THE LEGS.

Mr. Baynton's Method.

The plaster should be prepared by melting a sufficient quantity of litharge, or diachylon plaster, in the proportion of one

* By the translator.

ounce to half a drachm of resin; and when properly heated, it is to be stirred until it begins to cool, and then spread thinly upon slips of smooth porous calico. These slips should be about two inches in breadth, and of a length that will, after having passed round the limb, leave an end of about four or five inches.

After having shaved the parts, the middle of the first strip is to be applied to the sound part of the limb, oppositely to the inferior part of the ulcer, so that the lower edge of the plaster may be placed about an inch below the lower edge of the sore, and the ends drawn over the ulcer with as much gradual compression as the patient can well bear. The other strips are then to be secured in the same way, each above and in contact with the other, until the whole surface of the sore and the limb are completely covered, at least one inch below, and two or three above the diseased part.

The whole leg should then be equally defended with pieces of soft calico, three or four times doubled, and a bandage of the same materials, about three inches in breadth, and four or five yards in length, or rather as much as will be sufficient to cover the limb from the toes to the knee. This bandage should be applied as smoothly as possible, and with as much firmness as can be borne by the patient.

When the parts are much inflamed, or the discharge very profuse, the limb should be well moistened with cold spring water, as often as the heat may indicate it to be necessary, or at least once every hour. If the bandage be well applied, the patient, instead of being obliged to keep himself at rest, as it is necessary to do in the treatment of other kinds of ulcers of the leg, may take whatever exercise he pleases, and it will always be found, that an alleviation of his pain and the promotion of his cure will follow as its consequence.

“These dressings, when it can be conveniently done, should be applied soon after rising in the morning, as the legs of persons affected with this disease are then found most free from tumefaction, and the advantage will be greater than when they are applied to limbs in a swollen state.—The force with which the ends are drawn over the limb, must be gradually increased, and when the parts are restored to their natural state of ease and sensibility, which will soon happen, as much may be applied as the calico will bear, or the surgeon can exert; especially if the limb be in an enlarged and compressible state, or if the edges of the wound be widely separated from each other.”

This bandage is sometimes liable to produce excoriations of the skin; but these are only considered of serious consequence, when they are situated over the tendo-Achillis. Mr. Baynton recommends, with a view of preventing or relieving these ulcers, a small shred of soft leather to be put under the adhesive plaster; but it appears to us that a very thin piece of lead would be preferable.

VARICES.

The surgical treatment which is at present most generally employed in cases of varices, consists in compression, or making an incision in the direction of the length of the vessel, proportioned to the extent of the affection. The other methods, viz. those of applying the ligature and extirpating the varicose tumour, being attended with more danger and inconvenience than the disease itself, are justly abandoned.

Compression, though merely a palliative means, is the one, however, which is most generally employed: it is also the one which should be preferred whenever there is no obstacle to its employment, because it prevents the increase of the affection without injuring the patient, without even preventing him from following his usual occupations, although, in most cases, they are themselves the cause of the disease; but when the varices are red, tumefied, and painful, instead of compressing them, which would always be highly injurious, they should be covered with emollient applications, and be disgorge by the use of leeches or the knife.

The compression is made by means of a laced-stocking, a piece of soft leather, or a soft flannel roller, five or six yards in length, and about three inches in breadth. It should begin at the toes and be carried above the diseased part; care being taken that it be applied perfectly even and with moderate firmness.

The treatment by incision should never be employed, except in those cases in which the varices are so agglomerated together as to form a large and painful tumour, unable to bear the slightest degree of pressure, or in which the disease is accompanied with very unpleasant symptoms, or disables the patient from using his limb.

TREATMENT OF VARICOSE VEINS BY INCISION.

This operation, as performed by M. Richerand, consists in dividing the vessels in the direction of their length, to an extent proportioned to the size of the varices, in removing the blood which they contain, and dressing them like a simple wound. By this means the parts often become moderately inflamed, suppuration takes place, and the obliteration of the vessel is the consequence. The accident most to be dreaded after this operation, is the extension of the inflammation to the adjacent parts, especially to the venous trunks: great care should be taken therefore to prevent it as soon as the inflammatory symptoms have acquired the least intensity.* In order to avoid this formidable occurrence, Mr. Brodie has sug-

* See the treatment of phlebitis, page 45.

gested a method, which has several times been attended with success, both in his own practice, and in that of others, and which consists in dividing the veins, while the skin over them is preserved entire, with the exception of a moderate puncture, which is requisite for the introduction of the instrument with which the vessels are divided.

In performing this operation, the surgeon employs a narrow, sharp-pointed bistoury, slightly curved, with its cutting edge on the convex side. Having ascertained the precise situation of the vessel, the point of the bistoury is to be introduced through the skin on one side of the varix, and passed on between the skin and the vein, with one of the flat surfaces turned forwards, and the other turned backwards, until it reaches the opposite side. The edge of the bistoury is then turned backwards, and, in withdrawing the instrument, the division of the varix is effected. The patient always experiences some degree of pain, but this soon subsides. The hemorrhage is usually profuse, but it may be readily checked by moderate pressure, made by means of a compress and bandage, applied with moderate firmness.—The patient should be kept quietly in bed for four or five days, after which the bandage and first dressings should be removed with the utmost care and gentleness.

The cases in which this method is particularly recommended are those in which there is an impossibility of applying compression, great danger of hemorrhage in the dilated parts, or a painful and obstinate ulceration of the varicose tumours.

ULCERS FROM IRRITATION OF THE NAILS.

When the disease is recent, it may generally be readily remedied by placing a sufficient quantity of soft lint between the ulcerated surface and the edge of the nail, and by making pressure upon the soft parts which project above the nail, by means of lint, a thick narrow compress and bandage; at the same time that the patient is to be kept quietly at rest. The lint is to be renewed every second or third day, taking care gradually to increase the quantity and to push it farther in: the fungous excrescences are to be destroyed with the nitrate of silver. By this treatment the sore soon heals, and the lateral edge of the nail remains free, so as to form a right angle with the anterior edge, which passes over the skin and covers it without producing the least pain. This result may be more speedily obtained, and a relapse more effectually prevented, if, as has been recommended by Dionis, the middle of the nail be carefully scraped with a piece of glass or a knife, until it becomes so soft as to yield under the pressure of the finger. These simple dressings, when methodically applied, are generally attended with success. When, however, the fleshy projection is extremely large, and the patient is anxious to be

speedily relieved, it may be proper to cut it off on a level with the nail, by thrusting the point of a straight bistoury through its base, and cutting from before backwards. The parts are then to be dressed in the manner already stated, provided the pressure appears to answer the purpose; but if this be found to be insufficient, it will be necessary to pass a thin plate of lead under the nail, from two to three lines in breadth, and from eight to ten in length. In introducing it, the nail should be raised with a spatula, and after one of its ends has been carried under the nail to a sufficient extent, the other should be bent towards the lower part of the toe. It should be kept in its place by means of a strip of adhesive plaster and a small bandage, applied so as to depress the projecting soft parts.

When the disease is obstinate and of very long standing, the extirpation of the nail is the only effectual means of relieving the patient. This may be done, according to the method of Professor Dupuytren, in the following manner. The patient being placed upon the edge of a bed, the surgeon sits in front of him, and takes his foot upon his knee. Having done this, he takes a pair of strong, sharp scissors, introduces the blade underneath the nail, and passes it rapidly from the free edge to the middle of the base of the organ, dividing it from before backwards, into two equal portions. Each portion of the nail is then to be successively taken hold of with a pair of dissecting forceps, and removed, or simply the one which keeps up the ulceration. When the operation is finished, the fungous granulations should be destroyed by means of the actual cautery, and the parts dressed like a simple wound. In order to prevent a return of the nail, and thus insure a permanent cure, it will be advisable to employ one of the following methods, both of which are calculated to destroy the root of the nail. One consists in making a semi-lunar incision, with the convexity turned backwards, upon the dorsal surface of the great toe, about a line behind the loose edge of the skin covering the base of the nail. The other, which was suggested by M. Boyer, consists in applying a firm piece of lint over the groove which receives the root of the nail, and in fixing it by means of a strip of adhesive plaster and a bandage. This apparatus should be applied in such a manner as to keep up permanent compression, strong enough to excite adhesion between the parietes of the groove, and thereby produce a complete obliteration.

SECTION VII.

OF AMPUTATION OF THE EXTREMITIES.

General Observations.

Proper time for performing the operation.—Amputation should never be performed, except in those cases in which it presents the only chance of preserving the remainder of the limb, or of saving the life of the patient. Before the surgeon proceeds to the operation, he should always carefully reflect upon the actual dangers of the disease, and the chances which may be expected to result from the removal of the limb, in consequence of the nature and degree of the affection, as well as of the moral and physical state of the patient: this ultimate expedient, in fact, should never be resorted to, if possible, before the surgeon has held a consultation with some of his professional brethren; because nothing is more difficult than to discriminate between the cases in which it is absolutely necessary to remove the limb, and those in which there is reason to conclude that it may be preserved. As we have already had occasion, in different parts of this work, especially in the articles on gun-shot wounds, to speak of some of the cases which require amputation, we shall content ourselves with making the following additional observations.

The amputation of a limb is necessary; 1st, In dislocations of the ginglymoid joints, accompanied with severe injury of the bones and soft parts; or when there is a very extensive caries of the articular surfaces; a necrosis, attended with profuse suppuration, and an alteration of the new bone; in cases of white-swelling; in osteo-sarcoma and spina-ventosa; in very large exostoses, compressing the principal blood-vessels and nerves, and threatening to produce gangrene; and in cases of ankylosis, in which the limb is so much deformed as to be more injurious than useful. 2ndly, In cases of cancer of the soft parts, or large fungus hæmatodes. 3rdly, In cases of very large aneurismal tumours, which have produced extensive havoc amongst the adjacent parts. 4thly, In cases of severe wounds of the deep-seated arteries, where it is impossible to arrest the hemorrhage by means of the ligature, and the bleeding is so great as to induce us to believe that there will be gangrene of the neighbouring parts.

There are some circumstances, however, in which the operation should either be rejected, or where the results must always be doubtful. The most common of these are, the existence of a chronic disease of the lungs, or of the abdominal viscera; an engorgement of the lymphatic glands of the up-

per part of a limb affected with a cancerous complaint; and an invincible repugnance on the part of the patient to submit to the operation, or that great indifference which is observable in some individuals after they have received a severe injury.

With respect to the cases in which we may generally expect a favourable termination after the operation, it may be remarked, that the cure is always more prompt, and accompanied with less danger in very young subjects, or in adults, who, although endowed with a good constitution, have been enfeebled and reduced to great emaciation, in consequence of the profuse suppuration and long standing of the disease, for the cure of which the limb has been removed, than in robust and plethoric persons, upon whom the operation has been performed in consequence of very severe, recent wounds. It is well known, too, that the chances of cure are much greater, the farther the operation has been performed from the trunk: amputation of the hip-joint, in fact, being often attended with the most dangerous consequences.

Before the operation, the patient should be put in a proper condition for bearing it;* the instruments should be arranged upon a table; and every thing, in short, should be procured that may be necessary.

Instruments and dressings.—The instruments and dressings which are necessary in a case of amputation, are, 1. A tourniquet, a garrot or a pad, according to the circumstances of the case. 2. Several straight knives, of different sizes, with one or two edges. 3. Several straight and convex bistouries. 4. A pair of dissecting forceps. 5. An amputating saw, for dividing the bone. 6. Ligatures and curved needles. 7. A retractor, consisting of a piece of strong cloth, split into two or three strips at one of its ends, and calculated to defend the soft parts from the action of the saw. 8. Strips of adhesive plaster, pledgets and dossils of lint. 9. A small compress, calculated to envelope the ends of the ligatures. 10. Strips of linen, spread with fresh cerate, or a fenestrated compress, provided the surgeon does not intend to unite the parts by union of the first intention. 11. A few rollers and large compresses. 12. A pair of scissors, and the other materials which are usually required for dressing wounds.

The assistants must vary in number, and their position as well as that of the patient must be regulated by the kind of amputation that is to be performed.—In amputations of the upper extremities the patient should be seated upon a low chair and his legs should be extended in such a manner, that the feet resting very obliquely upon the floor, shall not enable him to raise himself. An assistant, standing behind the chair, is then to take a sheet doubled into several folds, and place it under the axilla corresponding to the limb which is to be amputated. The two ends are to be brought over the shoulder of the sound

* See the Article on Operations in General

side, and one arm is to be passed before, and the other behind the chest, so as to steady the trunk. When the patient, however, is very much enfeebled, he should be placed upon the edge of his bed, with his head and chest raised by pillows, and be held by two assistants.—In amputations of the inferior extremities, the patient is to be placed in an almost horizontal position, and in such a manner that the part of the limb, which is to be removed, shall project far enough beyond the foot of the bed. The bed should be narrow and not more than three feet high: an assistant, standing at its upper part or head, is to steady the patient by applying his two hands to the anterior part of the shoulders. The number of assistants necessary in cases of amputation of the inferior extremities is generally five or six. The two strongest are usually requested to hold the patient; the first takes hold of the trunk, the other of the sound limb. The one standing on the outside of the limb keeps it in a semi-flexed posture and separated from the other, by resting it firmly against his chest; care being taken to take hold of the dorsal, and not of the plantar surface of the foot. The third assistant, standing on the outside of the limb which is to be amputated, is to compress the vessels, and should be active and intelligent. The fourth is to hold the upper part of the limb; he is to stand on the outside, in the amputations of the thigh and arm, the leg and the fore-arm; and either on the inside or outside in that of the foot or hand, but always in such a manner as not to interrupt the operator. The sixth and last assistant is to hand the instruments and dressings. With respect to the operator, he should stand on the outside of the limb in the amputations of the thigh and arm, on the inside in those of the leg and fore-arm, and at the extremity of the limb in those of the hand and foot.

Division of amputations.—Amputations are divided, according to the place in which they are performed, into two great classes: into amputations through the continuity of the limbs, and into amputations through the contiguity or joints. The former are also distinguished into circular and flap amputations.

AMPUTATION THROUGH THE CONTINUITY OF THE LIMBS.

The principal rule to be observed in circular amputations, which are almost universally preferred at the present day, is to cut through the muscles in such a manner that the extremity of the stump shall represent a hollow cone, having the bone at its bottom. For this purpose the surgeon is to cut first through the skin, then through the superficial, and finally through the deep-seated muscles. The first incision is to extend through the skin and subcutaneous cellular tissue, and is to be made by a single stroke of the instrument. In performing it, the operator takes a large knife, the back of which is to be directed

backwards, and with the left hand he takes hold of the limb, and supports the soft parts which he is about to divide. The hand which is armed with the knife, is then to be passed under the affected limb, the fore-arm is to be bent, the radial edge of the hand is to be turned upwards, and the edge of the instrument, beginning at that part which is towards the handle, is to be applied perpendicularly to the upper and outer part of the limb, where the incision is to be commenced. The instrument is then to be rapidly carried round the limb in a circular line, which is to terminate at the point where the knife first touched the skin. Having thus divided the skin, it is to be drawn up by the assistant who supports the upper part of the limb, while the surgeon separates it from the surrounding cellular tissue. Another incision, similar to the first, is then to be made through the layer of superficial muscles, near the base of the retracted integuments; and after they have been drawn back by an assistant, the surgeon is to divide the deep-seated layer by applying his knife immediately at the base of the former, and cutting boldly down to the bone. Having divided all the soft parts, on every side, they are to be drawn up by means of a linen retractor. In the amputations of the thigh and arm, the retractor is applied by placing the exposed part of the bone in the slit, and drawing the ends of the linen upwards on each side of the stump, where they are to be crossed. In the amputations of the leg and fore-arm, on the contrary, the end of the middle strip of the retractor is to be carried from below upwards, between the two bones. The retractor, which thus covers the stump, is to be drawn firmly by an assistant towards the upper part of the limb, so as to support the muscles and defend them from the action of the saw. Before using the saw, care should always be taken to make a circular cut through the periosteum at the place where the instrument is to be applied, and then scraping it away below this point in the direction downwards. In dividing the bone, the saw should be taken in the right hand, its edge should be applied perpendicularly to the surface of the bone, and directing it by means of the nail of the thumb of the left hand, it should be drawn at first slowly and lightly; but in proportion as it advances, it is to be moved with more rapidity, care being taken never to press upon the instrument, or to incline the hand which embraces its handle. When the bone is nearly divided, the instrument should be again drawn slowly and even more lightly than in the beginning, in order to prevent the bone from being splintered; at the same time that the assistant who holds the lower part of the limb, takes care to depress it a little, so as to enable the saw to move with more facility, though not so far as to break the bone. When this happens, however, the sharp-pointed, projecting spiculæ thus occasioned, are to be removed with a small saw, or a pair of bone-nippers. When it is necessary to saw two bones together, as in the leg or fore-arm, they should be held firmly by an assistant, and the bone which is

articulated with the os femoris or the humerus, should be sawn through last, since it is better adapted to bear the weight of the saw.

AMPUTATION AT THE JOINTS.

In amputations at the joints, the soft parts are always to be divided by making one or two flaps. In the latter case, they should be made oppositely to each other, in the direction of the smallest diameter of the bones and the thinnest parts of the integuments and muscles, and in such a manner as to cover the articular extremity. The manner of dislocating the bone must always vary, as we shall hereafter have occasion to point out, according to the nature of the joint; but, as a general rule, it may be stated, that we should always, if possible, commence with dividing the ligaments by which the articular surfaces are kept firmly in contact, in order that the knife may be the more easily passed between them.—After the operation is finished, the wound is to be united by union of the first or second intention; the latter of which is often preferable when there is reason to apprehend the formation of abscesses and synovial fistulæ in the stump.

After the operation is finished, the first thing to be done is to wipe away the coagula of blood which obstruct the mouths of the retracted vessels, and then proceed to take up every artery that can possibly be discovered. This precaution, though it renders the operation somewhat tedious, is the surest means of preventing consecutive hemorrhage. It sometimes happens that the arteries are so strongly retracted, that it becomes extremely difficult to detect them. When this is found to be the case, it will be necessary either to suspend for a moment the pressure of the principal artery, or, what is still better, to trace its orifice upon the extremity of the amputated limb, and then look for it at the corresponding point of the stump. By this means, it will be easy to find every vessel, by separating the muscles by which it is concealed, and secure it with the ligature. If there should be any hemorrhage from the nutrient artery of the bone, it should be checked by obliterating the osseous canal with a small ball of soft wax or diachylon plaster.

When all the vessels are tied, which may be known by removing the pressure from the principal artery, the next thing to be done is to dress the wound, either immediately, or, as has been recommended by Professor Dupuytren, an hour or two after the operation. Having cut off one of the ends of each ligature close to the knot, or both, if we adopt the English method, the other is to be brought towards the inferior angle of the wound, where they are to be secured in the manner we shall presently state. The edges of the wound are then to be approximated by means of an assistant, who takes hold of the stump with both his hands, and while he brings

them into apposition, the surgeon applies a sufficient number of strips of adhesive plaster to keep them together. This generally suffices to prevent the retraction of the muscles, but we are sometimes obliged to support them by a few turns of a bandage, extending from the upper part of the stump to its lower extremity, and drawn in such a manner as not to compress the parts. When it is designed to let the wound suppurate, which is seldom indicated, the dressings should be similar to those which are used in cases of suppurating wounds. When the edges of the wound have been approximated, the ends of the ligatures are to be enclosed in a small compress, and placed under the stump; the extremity of which is then to be covered with pledgets of lint and a few compresses, and the whole is to be supported with a moderately tight bandage.

When the dressing is finished, the patient is to be cautiously placed in his bed, and the stump is to be supported upon a firm pillow, and carefully protected from injury.

For an account of the consecutive dressings, and the accidents which sometimes occur after the operation, the reader is referred to the Articles on the General Observations on Operations and the Treatment of Complicated Wounds.

*Particular Amputations.**

AMPUTATION AT THE SHOULDER-JOINT.

a.—Dupuytren's Method.

The arm being held horizontally at a right angle with the trunk, the surgeon stands at the inside of the limb, with one hand grasps and elevates the deltoïd muscle, and plunges under it a two-edged knife, from before backwards, on a level with the end of the acromion. Cutting in this way close to the head of the humerus, he extends the incision downwards between this bone and the deltoïd, and at length bringing out the knife, completes the external flap. This being held back by an assistant, the arm is to be strongly depressed, and the head of the humerus is to be dislocated by dividing the capsular ligament and the tendons of the supra and infra spinati, the sub-scapularis and the long head of the biceps. The surgeon then takes hold of the lower flap, before dividing it, and compresses the artery, until he has cut through it and applied a ligature.

Whichever may be the arm upon which the operation is to be performed, the surgeon may always hold the knife in the right hand, but in removing the left arm, he should stand be-

* The following rules, especially those which relate to the manner of dislocating the joints, are subject to different modifications, in consequence of the alterations which the parts may have undergone upon which these operations are to be performed; but they are all applicable to the operations upon the dead subject.

hind the patient, and reach over the shoulder from behind forwards, in the manner we have already stated: if the surgeon, however, be an ambidexter, he may use his left hand in operating on the left arm, and vice versâ.

b.—Lisfranc's Method.

This method, which is particularly commendable on account of its celerity, is thus described by its author.

First stage of the operation.—Supposing that the left extremity is to be removed, the patient is placed on an elevated seat, and an assistant draws the arm forwards, so as to separate it about three or four inches from the trunk, while the surgeon, standing behind the patient, with a catling, about eight inches long, and eight lines in breadth, grasps the shoulder with his left hand, by applying his thumb on the posterior surface of the humerus, and the fore and middle fingers on the triangular space comprised between the scapular extremity of the clavicle, the coracoid process and the head of the humerus, and plunges the knife through the integuments, parallel to this bone on the outside of the posterior margin of the axilal, in front of the tendons of the latissimus dorsi and teres major. The blade of the instrument forms an angle of about forty-five degrees with the axis of the shoulder; and is passed along the posterior and external surface of the humerus, until it comes into contact with the acromio-clavicular surface. Here, the handle of the instrument is to be raised, and separated two or three inches from the arm, so as to lower its point, at the same time that it forms an angle of from thirty to thirty-five degrees with the axis of the joint. The knife is then passed through the joint, so as to come out on the external side of the triangular space above-mentioned; and while the handle remains nearly motionless, the end of the blade is to be carried from within outwards, and a little from below upwards, round the head of the bone. As soon as the point of the instrument has passed out between the humerus and acromion, it is to be moved in the same line as its handle. The knife is then carried along the outside of the arm, and the flap is terminated at about three inches from the joint. This flap is to be immediately held back by an assistant.

Second stage of the operation.—The surgeon lowering the hand and cutting from the heel to the point of the knife, passes it from behind forwards to the inner side of the head of the humerus, and along this bone until it has arrived about three inches below the joint. In making this incision, the handle of the instrument is to be held perpendicularly to the horizon; and before the surgeon has completely detached the arm, by means of an incision made perpendicularly to the axis of the muscular fibres, an assistant, standing behind the patient, compresses the axillary artery between his two thumbs placed on

the bloody surface of the flap, while the four fingers of each hand are applied to the integuments of the internal and anterior surface of the limb.

The posterior flap contains the external extremities of the latissimus dorsi, the teres major and minor, the supra and infra spinati, the long portion of the biceps, the scapular head of the triceps, all the acromial portion of the deltoïd, and almost the whole of that which is attached to the clavicle on the outside of the coracoid process.

The anterior flap is formed by the rest of the clavicular portion of the deltoïd, by the pectoralis major, the coracoid portion of the triceps, the coraco-brachialis, part of the biceps, the nerves and axillary vessels.

When the operation is on the right side, the patient is to be placed on a low chair, and the instrument is to be thrust from above downwards, reversing the movements before described.

When the operation is finished, the arteries are to be tied, the wound cleaned, and a few dossils of lint are to be placed in its bottom. The edges of the wound are then to be slightly approximated by strips of adhesive plaster, and covered with pledgets of lint; and the whole is to be supported by a few compresses and a capistrum.

Professor Richerand, in speaking of Lisfranc's mode of operating, observes, "by this method we are enabled to dislocate the humerus, and separate the arm in as short a time as an expert carver would detach the wing of a partridge."—*Nosographie Chir.* T. 4. p. 514.

DESCRIPTION OF THE CAPISTRUM.

The capistrum consists of a bandage, about eight yards long, three inches wide, and rolled into two unequal heads, the smallest of which contains only about a yard and a half of the bandage. The small head is to be applied upon the middle of the shoulder, while the other is directed obliquely across the chest, under the opposite axilla, and brought over the back, until it comes in contact with the preceding, where it is to be fastened. The small head is then to be carried under the axilla, and from before backwards over the inside of the stump, as far as the back part of the shoulder, where it is to be secured by the other part of the roller. This is then to be passed round the chest and the back, in the manner just mentioned, until the stump is completely covered.

AMPUTATION OF THE ARM THROUGH THE CONTINUITY OF THE BONE.

The patient being properly seated, the arm is to be raised from the side, and put in a horizontal position. An assistant is then to compress the brachial artery, either with the fingers,

against the inner part of the inferior third of the humerus, if the operation is to be performed very low down; or, in cases of an opposite nature, below the head of this bone, by placing a pad in the hollow of the axilla, and applying the garrot over the acromion. The surgeon, standing on the outside of the limb, makes a circular incision through the skin, about one inch above the condyles, detaches it from the brachial aponeurosis, divides the muscles perpendicularly as far as the bone, requests an assistant to hold them back, and then carries the knife upon the cone which they form and completes their division; care being taken not to omit the radial nerve, which not unfrequently glides under the instrument to the place where it winds round the humerus. When the soft parts are divided, they are to be held back by means of a linen retractor, the bone is to be sawn with the usual precautions, and the bleeding stopped in the ordinary way, care being taken not to include the median nerve, which adheres closely to the brachial artery.—The wound is then to be closed so as to form an anterior and a posterior flap, the latter of which is to contain the ends of the ligatures; the dressings are to be applied; and the patient put to bed.

AMPUTATION OF THE FORE-ARM.

I.—*Amputation at the middle of the limb.*—The fore-arm being held horizontally, and in a middle position between pronation and supination, by two assistants, one of whom takes hold of the elbow, and the other of the wrist, the tourniquet is to be applied to the lower part of the arm, and the assistant holding the elbow is requested to draw up the integuments, so as to make them tense. The surgeon, standing on the inside of the limb with a catling, makes a circular incision down to the fascia; from this as much skin is to be detached and reflected, as is necessary for covering the ends of the bones, and the muscles are to be cut on a level with the reflected skin, as far down as the bone. Having done this, and requested an assistant to hold back the muscles, the surgeon completes the division of the tendons, and separates the bones by means of an incision made in the form of a figure of S. For this purpose the point of the knife is to be introduced between the two bones at their dorsal surface, so as to divide the interosseous muscles and ligament. The instrument is then to be withdrawn, and passed under the radius, and after the bone has been laid bare, its point is to be again introduced between the two bones, at their palmar surface, the muscular adhesions are to be detached, and the knife withdrawn, in order to carry it upon the inner and anterior part of the ulna, so as to divide the rest of the soft parts. The parts are then to be held back by a retractor, the periosteum is to be divided, and the bones sawn with the precautions pointed out at page 422, care being

taken that the fore-arm be placed in the utmost state of pronation.

When the operation is finished, the surgeon is to tie the radial, ulnar, and interosseal arteries, the two former of which are situated at the inner and outer side of the stump, in front of the bones, and are each accompanied by a nerve, which should be carefully excluded from the ligature. After the hemorrhage has thus been arrested, the integuments are to be brought over the bones and approximated so as to form an anterior and a posterior angle.

II.—*Amputation at the inferior third of the limb.*—Having arranged every thing as in the preceding operation, the surgeon takes hold with his left hand of the part which is to be removed, thrusts the point of the catling from below upwards towards the inner and anterior part of the ulna, and makes it come out at the point corresponding to the outer and anterior part of the radius, so as to form a flap, of about one or two inches in length, by cutting towards the hand. Another flap, of the same size as the preceding, is then to be made on the dorsal surface of the fore-arm, and the operation is to be finished in the manner already stated.

AMPUTATION AT THE RADIO-CARPAL JOINT.

The hand is to be held in a state of pronation, and the fore-arm is to be steadied by an assistant, who draws the integuments from below upwards, so as to make them tense. The surgeon standing at the extremity of the limb, takes hold of the diseased part with his left hand, and while he gently bends it, he forms a flap by means of two lateral oblique and a transverse incision, detaches it, reflects it, and commits it to the care of an assistant. The surgeon then divides the tendons of the extensors of the fingers and the radius, the long and short extensors of the thumb and that of the abductor magnus, cuts through the external lateral ligament and enters the joint by carrying the knife below the styloid process of the radius, between it and the trapezium; divides the posterior, and then the internal lateral ligaments. When the joint is opened, the surgeon should bend the hand to the utmost, and by gliding the knife between the bones and the soft parts on the palmar surface of the carpus, he should form the anterior flap proportioned to the extent of the wound, by shaving, as it were, the bones, and cutting in such a manner that the instrument shall come out near the palm of the hand. In order to avoid the pisiform bone, which may be easily detached by carrying the knife too far towards the radial margin of the joint, it is necessary that the fore-finger of the left hand should be placed in the groove of that bone and serve as a guide to the instrument.

After having tied the radial and ulnar arteries, which will be found on each side of the anterior flap, a few pledgets of lint

should be placed between the two flaps, which are to be imperfectly approximated in the direction of the antero-posterior diameter. The flaps should not be united until suppuration has been established, and the sheaths of the tendons are obliterated. The apparatus is to be supported by means of a roller about five yards in length, which is to be carried several times round the lower part of the arm, and then over the bend of the elbow and fore-arm, as far as the end of the stump.

AMPUTATION OF THE THUMB AT THE CARPO-METACARPAL JOINT.

Having arrested the course of the blood by compressing the brachial artery on the inside of the arm, or the radial and ulnar arteries at the anterior and lower part of the fore-arm, the hand should be held in a state of pronation and the fingers should be separated by an assistant. The surgeon, standing at the extremity of the limb with a straight bistoury, takes hold of the thumb with his left hand, and makes a free incision through the soft parts, which are comprised between the thumb and fore-finger, by carrying the instrument along the ulnar edge of the first metacarpal bone. When arrived at the os trapezium, he should direct the edge of the knife towards the joint, which is now to be opened by cutting through the capsular ligaments. The thumb is then to be turned outwards, the blade of the instrument is to be glided between the two articular surfaces, and the soft parts which form the thenar eminence are to be divided, by passing the knife along the outer edge of the bone, so as to form a flap proportioned to the one on the opposite side. In cutting this flap, the thumb is to be brought in its natural position.

As the radial artery is almost always divided in this amputation, it should be searched for at the upper part of the first interosseous space, and tied. The flaps are then to be brought into contact, and kept in apposition by means of a few strips of adhesive plaster, which are to be crossed over the palmar and dorsal surface of the hand.

AMPUTATION OF THE LITTLE FINGER AT THE CARPO-METACARPAL JOINT.

This operation, though more difficult than the preceding, on account of the narrowness of the interosseous space, is performed on the same principles as the other.

AMPUTATION OF THE FINGERS AT THE MATACARPO-
PHALANGEAL JOINTS.*Lisfranc's Method.*

The hand being held in a state of pronation, the fingers adjoining the one which is to be removed, are to be separated by the assistant holding the fore-arm, while the surgeon takes this finger between the thumb and fore-finger of the left hand, and makes an incision, commencing at the middle of the joint, and terminating at the middle of the phalanx. A second incision is then to be made perpendicularly to the preceding, by depressing the handle of the instrument towards the patient's wrist; and when the knife has reached the palmar surface of the finger, a third one is to be made exactly parallel to the first. The surgeon is then to dissect up the first flap by passing the blade of the bistoury along the bone towards the metacarpus, until it comes into contact with the upper head of the phalanx. The direction of the blade of the instrument is then to be changed, and passed perpendicularly through the joint. At this moment it is necessary to hold the integuments from the instrument, which is now to be introduced between the phalanx and the soft parts, and carried from behind forwards, so as to make a flap of the same size and form as the preceding. When the operation is performed upon the little, or fore-finger, the internal flap of the first, and the external of the second, should be made longer than in the other fingers.

When the operation is finished, no arteries need be tied, and the dressings may be immediately applied. These consist in keeping the edges of the wound in contact, by means of two strips of adhesive plaster, the middle of which is to be applied over the flaps, and the ends are to be carried across the dorsal and palmar surface of the hand.

AMPUTATION OF THE FINGERS AT THE PHALANGEAL
JOINTS.

The hand being placed in a state of pronation, all the fingers, except the one which is to be amputated, are to be closed. The surgeon having ascertained the situation of the joint, takes the finger in his left hand, and makes a curved flap, with the convexity towards the nail, on the dorsal surface, below the articulation. When this flap is finished, the blade of the bistoury is to be passed behind it, so as to divide the tendon of the extensor muscle, and the lateral ligaments. The joint is then to be bent to the utmost, and the bistoury is to be directed downwards and forwards, so as to form the anterior flap, which should be a little longer than the posterior. When

the operation is finished, the wound is to be dressed as directed in the preceding article.

AMPUTATION AT THE HIP-JOINT.

The want of success which so frequently attends this dreadful operation, should always make the surgeon extremely cautious with regard to its employment. It is sometimes, however, absolutely necessary, and when this is the case, no time should be lost in performing it.

The operation should be performed: 1st, When the head or neck of the os femoris has been shattered by a ball, or the explosion of a howitzer or bomb. 2ndly, When the thigh-bone has been broken towards its upper part, and the soft parts have been extensively torn and lacerated. 3rdly, When the limb has been carried away so near the pelvis that it is impossible to perform the circular amputation. 4thly, When, in consequence of a severe wound, or other violence, the upper part of the limb is either already in a state of mortification, or is threatened to be so. The operation may be performed in different ways, but we shall only describe those of Baron Larrey, Guthrie, and Lisfranc.

A.—Baron Larrey's Method.

The surgeon commences with making an incision in the track of the crural artery in the bend of the groin, and, after carefully excluding the nerve, which is situated more externally, he ties this vessel, with the aid of a curved needle, as closely as possible to Poupart's ligament, in order that the ligature, which is placed above the origin of the circumflex artery and the profunda, may obviate all inconvenience from the bleeding, which would otherwise be apt to occur.* A straight knife is then to be plunged perpendicularly from before backwards, between the tendons of the muscles attached to the trochanter minor, and the base of the neck of the femur, so as to bring out its point at the back part of the limb, in a situation diametrically opposite to its first entrance; and now by directing the knife obliquely inwards and downwards, a proper flap is to be made of the soft parts at the inner and upper portion of the limb. The flap is then to be drawn towards the scrotum by an assistant, and the obturator artery, and some of the branches of the pudendal, are to be immediately tied. The thigh is now to be put in a state of abduction; and the inner part of the orbicular ligament, made tense by

* It would appear that the author of this method, instead of applying the ligature as stated in the text, is contented with simply compressing the artery against the os pubis. Professor Delpech, however, regards it as necessary.

this position, is to be divided. The point of the knife is then to be passed into the joint, and after having cut the ligamentum teres, and dislocated the femur, it is to be brought to the outside of the great trochanter, and an external flap formed of the soft parts, calculated to meet the one which has been made at the inside of the limb.

In proceeding in the operation, care should be taken to tie the vessels as soon as they are divided; and when it is finished, the flaps are to be brought together, and kept in this position by strips of adhesive plaster, pledgets of lint, a few compresses, and a spica bandage.

B.—Guthrie's Method.

The patient is to be placed in a horizontal posture, and the femoral artery is to be compressed against the os pubis. The surgeon, standing on the outside of the limb with a long amputating knife, makes two curved incisions through the skin and cellular tissue, commencing about four inches below the antero-superior spinous process of the os ilium, and passing downwards, the one on the inside, and the other on the outside, so as to meet and form an angle behind, directly opposite to the tuberosity of the ischium. The muscles are then to be divided in the same direction, on a level with the retracted skin, so as to form two large flaps, one internal and anterior, the other external and posterior. The vessels being now tied, the flaps are to be brought together, and kept in this position by three sutures, a few strips of adhesive plaster, and the dressings mentioned in the preceding operation.

*D.—Lisfranc's Method.**

The nates of the patient resting upon the edge of the table, and the limb being supported by an assistant, the operator draws a line, an inch in length, from the antero-superior spinous process of the ilium, straight down the thigh. From this point, he marks another inwards towards the pubes, of half an inch, so as to form a right angle. On the inner extremity of the last, he places the point of a long-bladed catling, and pushes it perpendicularly downwards, till it strikes against the head of the femur. Then passing it on the outer side of the bone, he thrusts it outwards till it protrudes at about an inch from the margin of the anus. He now cuts outwards, for near an inch, in order to clear the great trochanter, and forms the external flap, four or five inches in length, by cutting down the limb between the muscles and bone. The femoral artery, which may now be seen, is to be compressed between the fingers and thumb of an assistant, while the operator thrusts the

* By the translator.

knife in and out at the same points, as before; but, carrying it on the inner side of the head of the bone, he forms a smaller flap on that side of the extremity. He then, with the point of his knife, cuts through the capsular ligament, dislocates the bone, and removes the limb by dividing the ligamentum teres.— See *Averill's Operative Surgery*, p. 158.

CIRCULAR AMPUTATION OF THE THIGH.

The patient being placed on the edge of a strong table or operating bed, about three feet high, with his head supported by pillows, and the sound leg held in a semi-flexed position by an assistant, the limb is to be placed horizontally and is to be supported by three assistants, one of whom is to grasp the foot, another the thigh above the knee, while the third takes hold with both his hands of the upper part of the limb and draws up the integuments. The fifth assistant is to interrupt the circulation of the blood in the limb by compressing the femoral artery against the os pubis a little obliquely from below upwards, either with his fingers or a firm compress. The sixth is requested to hand the instruments to the operator, and two others to hold the patient. Having ascertained that every thing is right, the surgeon is to stand on the outside of the limb, and make three circular incisions, in the manner already pointed out,* comprehending successively the integuments, and the superficial and deep-seated muscular layers; or, what is more easy and expeditious, he should make a circular cut through the skin about two or three inches above the place where the bone is to be sawn, and, after having separated the integuments from the loose cellular tissue by which they are connected to the subjacent parts, they are to be turned back, and the muscles are to be divided by one continued sweep of the instrument. An assistant is now to pull the parts forcibly upwards, by means of a retractor, while the surgeon makes another incision through the part of the flesh which adheres to the bone, round that point where the saw is to be applied, at the distance of two or three inches above the first, so as to hollow out, as it were, the front of the muscles in the form of a cone. The parts are then to be again retracted, and the bone is to be divided by the saw as far up as possible, and the limb removed.

After having secured the femoral artery, some of the branches of the profunda and other arteries, the wound is to be united so as to form an anterior and posterior angle; or, according to the method of Mr. Alanson, which is preferred by some practitioners, the parts may be brought together from before backwards. This practice possesses this advantage, that the bone, instead of pressing against the cicatrix, as it often happens in

* See page 421.

the common mode of dressing, rests upon the thick soft parts which form the anterior part of the wound.

An excellent mode of amputating the thigh with two flaps was proposed some years since by Dr. Davidge, professor of Surgery in the University of Maryland. The first incision is made with a large knife on the external and internal side of the limb, through the integuments, so as to surround the thigh, with the exception of an inch or more in the centre, above and below. The operator having calculated the size of the flaps required, which are to be as long as the semi-diameter of the limb, takes a scalpel and makes a second and third incision through the skin, in the form of the letter V, commencing in the centre of the space left vacant on the superior and inferior surface, and extending as far as the semi-circular cuts first mentioned. The cutaneous flaps are then to be reflected back until they equal in length a little more than the semi-diameter of the limb. The muscles are then to be divided by a circular incision, and after having exposed the bone to the extent of about one or two inches, it is to be sawed off at the edge of the divided flesh. The arteries are then to be secured; the muscles drawn down; the ligatures arranged so as to come out at the upper and lower angle of the wound; and the flaps are to be brought together by strips of adhesive plaster and a bandage. This operation is not only neater than the ordinary one, but it prevents the integuments from being puckered at the angles of the wound, and greatly facilitates the escape of the matter, which drains off as soon as secreted.—*Coster's Surgery, by Godman, p. 74.*

CIRCULAR AMPUTATION OF THE LEG.

This operation is always performed about three inches below the anterior tuberosity of the tibia, in order that the stump may be sufficiently long and not be deprived of that power of motion which arises from the flexor tendons of the leg remaining undivided.

The circulation of the blood in the limb should be arrested by compressing the femoral artery, either at the bend of the groin, with the aid of the fingers or a firm pad, or at the middle and lower part of the thigh by means of the tourniquet. The patient is to be placed upon a firm table, as in the amputation of the thigh, and the leg being supported by one assistant holding the foot, while the integuments are drawn upwards by another, the surgeon standing on the inside of the limb with a catling, is to make a circular incision through the integuments at about two inches below the place where it is intended to saw the bones. The large knife is now to be exchanged for a bistoury, with which the surgeon separates the loose cellular tissue, connecting the integuments to the fascia and tibia, and turns back the skin to the extent of about one and a half or two inches. Having resumed the amputating knife, and keeping its edge close to the base of the retracted or reflected skin, he next cuts the muscles down to the bone with one continued sweep of the instrument. The catling is then to be thrust between the two bones, and the muscles and interosseous membrane divided, the middle strip of a linen retractor introduced, the soft parts

drawn up, the periosteum divided, and the bones sawed off, either in the way we have already stated, or as recommended by Professor Beclard. The method of this gentleman consists in sawing through the fibula first, and then dividing the tibia about one half. The instrument is then withdrawn, and the periosteum is divided about half an inch above the track of the saw, by carrying a bistoury over the spine, and obliquely along each side of the bone. The saw is then to be passed in the direction of the incisions, and the projecting angle of the tibia is thus to be detached. The instrument is now to be introduced into its former track, and the bone sawn off. This method, which has already been adopted by several surgeons, has the advantage of obviating the destruction of the skin at the anterior part of the stump, and of preventing the denudation of the projecting angle of the tibia; accidents which are not of unfrequent occurrence in the common mode of operating.

Having carefully tied the tibial and fibular arteries, and any other that may require the ligature, the stump should be bent, and the integuments brought over the surface of the wound, which is to be united from before backwards, if the leg be very muscular, but transversely, if it be thin. After having applied the adhesive strips, they are to be covered with lint, and a few compresses. These last, in their turn, are to be secured by the Malta-cross, the ends of which are fastened down by a roller, passed round the whole thigh, and prevented from slipping downwards by being carried several times round the patient's pelvis.

AMPUTATION OF THE FOOT AT THE ARTICULATION OF THE ASTRAGALUS AND OS CALCIS, WITH THE SCAPHOIDES AND CUBOIDES.

Having ascertained the position of the joint, the surgeon is to take hold of the foot with the left hand, and make a semi-lunar incision, with the convexity forwards, upon the dorsal surface of the foot, commencing at the projection formed by the os scaphoides at the inner margin of the foot, and terminating at the tuberosity of the posterior extremity of the fifth metatarsal bone. This incision is to extend through the integuments, the extensor tendons, and muscles of the foot.

Having thus exposed the convexity of the tarsus, the surgeon is next to open the astragalo-scaphoïdeal joint, by passing the blade of the knife in the direction of a line, commencing at the inner side of this joint, and terminating at the cuboïdeal extremity of the fifth bone of the metatarsus. The foot is now to be bent downwards, and the dorsal ligaments divided. The calcaneo-cuboïdeal joint is then to be laid open, and luxated, like the other, by bending the foot, and the inter-articular ligament divided. The articular surfaces being now held

apart, the knife is to be passed between them, so as to come out below the tarsal and metatarsal bones, by cutting from above downwards, with the precaution of directing the instrument so as to leave a flap composed of a part of the sole of the foot. This flap should be somewhat longer than the upper, in order that it may entirely cover the wound, which is larger at the inner than at the external part.

Every artery is to be tied as soon as it is divided. The continuation of the anterior tibial artery will be found in the upper flap, while the internal and external plantar arteries will be found in the lower. After these vessels have been secured, the flaps are to be brought together, and kept in this position by strips of adhesive plaster.

PARTIAL AMPUTATION OF THE FOOT AT THE TARSO-METATARSAL JOINT.

Professor Lisfranc's Method.

The leg being held properly by an assistant, the surgeon takes hold of the end of the lower part of the foot with his left hand, by applying the thumb upon the projection formed by the tuberosity of the posterior extremity of the fifth metatarsal bone, and having ascertained the situation of the tarso-metatarsal joint, he places his left index-finger upon it. He then takes a short narrow knife, and makes a semi-lunar incision, with the convexity forwards, upon the dorsal surface of the foot, commencing at the tuberosity at the posterior extremity of the fifth metatarsal bone, and terminating at the tarso-metatarsal joint. The skin being now drawn back, the surgeon takes hold of the dorsum of the foot, divides the ligaments which connect the fifth metatarsal bone with the os cuboïdes, and passes the knife through the external part of the joint, with the precaution to carry its blade in the direction of a line, commencing at the external side of this joint, and terminating at the anterior extremity of the first bone of the metatarsus. After having detached the ends of the next two metatarsal bones, by carrying the knife less obliquely, the instrument is to be passed over the inside of the joint. The point of the instrument is then to be directed upwards, and the joint of the first bone of the metatarsus and the first cuneiform bone is to be laid open by cutting in the direction of a line, extending from the internal edge of the joint to the middle of the fifth metatarsal bone. The surgeon now thrusts the point of the instrument from above downwards between the projection of the first cuneiform and second metatarsal bone, and elevates the handle of the knife so as to describe the segment of a circle, in order to divide the inter-articular ligaments which connect these bones, and the strong ligament which extends from the second metatarsal to the first cuneiform bone.

The foot is then to be bent forcibly downwards, the inter-articular ligaments are to be divided, and when the joint is completely opened, the knife is to be passed under the metatarsus from behind forwards, and a flap formed long enough to admit of being applied to the denuded bones, so as entirely to cover them.

In operating upon the left foot, the first incision should always be made on the inside.

As this operation is attended with considerable difficulty, Professor J. Cloquet has suggested the idea, with a view of rendering it more easy and less painful, to cut the metatarsal bones across with a small saw, instead of disarticulating them.

AMPUTATION OF THE TOES.

The amputation of the toes is performed in the same manner as that of the fingers, excepting that on commencing the incision the surgeon should always cut with the point, instead of the whole edge of the knife, and that the incision should be made parallel with the bone as far as the opposite joint, which is more deeply situated. The instrument is then to be passed between the articular surfaces, and the operation finished as in the amputation of the toes.

The operation for removing all the toes is performed upon the same principle as the amputation of the fingers, with the exception, that the great toe is included in this operation, while in that of removing the fingers the thumb is saved.

THE END.

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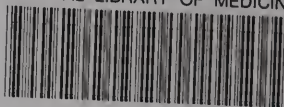
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